AUTOMOTIVE INDUSTRIES

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De Soto In New Plant

Capacity of 500 Cars Per Day Possible With New Arrangement

The De Soto division of the Chrysler Corp. moved, this week, into its new and modern plant in Detroit. Cars have started rolling off the line and production facilities make possible the manufacture of 500 cars per day. Already 1750 additional employees have been hired.

The plant itself consists of two large units. One unit is devoted to machining operations and to the final assembly of new cars. The other large unit, the press plant, is used for sheet metal stamping. An enormous tooling program has been completed with the installation of the most modern machines and other facilities.

More than 650,000 sq. ft. of floor space is included in the two units. It is arranged for efficient movement of sheet metal from railway cars to and from the presses, of parts, sub-assemblies and bodies to the assembly line, and of the finished cars to inspection lines and shipment.

The move into the new plant comes near the close of a year that will see De Soto increasing its unit sales by about 60 per cent over the previous year. Its distributing organization has grown to nearly 3000 dealers whose sales in 1936 of De Soto and Plymouth cars, will total approximately 190,000 units.

Hupp Sells 3 Plants

Hupp Motor Car Corp. has sold three of its four plants in Cleveland to the Weatherhead Co. Amount of the transaction is not disclosed, but a Hupp official said it was not enough to permit the company to begin its 1937 manufacturing program. Hupp management is working on plans for new financing which it hopes to announce at a stockholders meeting scheduled for Oct. 7.

Portrait by Redman, Especially for Automotive Industries

Harry T. Woolson

Chrysler Corporation's executive engineer, whose nomination for presidency of the Society of Automotive Engineers was announced this week

S.A.E. Nominates Woolson

Chrysler Executive Engineer Slated To Serve As President for 1937 Term

Nomination of Harry T. Woolson, executive engineer, Chrysler Corp., for president of the Society of Automotive Engineers, Inc., in 1937, was announced this week by the Society, which made public also nominations for three councilors, nine vice-presidents representing the professional activities, and other general officers of the Society.

David Beecroft, manager of the New York office, Bendix Aviation Corp. and veteran treasurer of the S.A.E. has been nominated for an additional term.

Nominated as councilors at large are A. T. Colwell, director of engineering, Thompson Products, Inc.; W. C. Keys, mechanical products engineer, U. S. Rubber Products Co., and J. L. Stewart, general manager, Canadian Automobile Chamber of Commerce. Mr. Colwell is past chairman of the Cleveland Section of the S.A.E., Mr. Stewart of the Canadian Section, and Mr. Keys has served as chairman of the membership committee of the general Society.

Vice-presidential nominees for 1937 with the

(Turn to page 431, please)

Dealers Buying Heavily

Enthusiasm At Previews of New Cars Heralds Fat Final Quarter

The enthusiastic public reception accorded the first 1937 cars on the market as well as the continued brisk business being done on 1936 models augurs well for an active fall season in the motor vehicle industry. Distributors attending previews and sales conventions at the factories are leaving behind heavy commitments for the new cars before returning to their territories. Many are completely sold out of old lines and are pressing for early shipments.

While marked irregularity is shown by retail sales figures currently being reported, demand for cars continues to show a strong undertone. Wherever field stocks are adequate, sales are being maintained in good volume. In one notable instance, deliveries during the first 20 days of September of 1936 models ran slightly ahead of the corresponding period in August. Only where dealers' stocks are so depleted that they offer limited selection to buyers are sales showing sharp declines. Companies in that position ran as much as 32 per cent under their August volume last month on basis of the first 20 days' report. August deliveries for the industry as a whole totaled 330,000 units, or 17 per cent under the July volume.

Seven more plants went into production on 1937 models during the past week, making 14 now under way on new manufacturing programs. Only four now remain to join the ranks and these expect to get along within a week or 10 days. Two are big-volume producers.

Thus the final quarter gets off to a good start from both production and sales standpoints. The current month, however, may not account for quite as many vehi-

(Turn to page 458, please)

GM's Share 44% for 8 Months

Total Registrations Gain 25% Over 1935; Chrysler Group Has 24% of Total and Ford-Lincoln 22.88%

New Passenger Car Registrations

	August 1936	July 1936	August 1935	Eight Months 1936	Eight Months 1935	Per Cent Change, 8 Mos., 1936 over 1935	Numerical Change, 8 Mos., 1936 over 1935	Per Cent of Total Eight Months 1936	Per Cent of Total Eight Months 1935
Chevrolet	74,496	99,678	68,281	702,474	451,671	+ 55.5	250,803	28.40	22.80
Ford	59,582	81,703	61,590	557,062	633,261	− 12.0	−76,199	22.52	31.97
Plymouth	38,745	51,764	32,147	350,519	285,878	+ 22.3	64,641	14.17	14.43
Dodge	19,816	25,838	14,888	176,247	130,762	+ 35.0	45,485	7.13	6.60
Oldsmobile	13,047	19,602	11,839	141,391	107,911	+ 31.0	33,480	5.72	5.45
Pontiac	12,936	18,693	11,906	123,478	102,238	+ 20.8	21,240	4.99	5.16
Buick	11,378	15,482	4,717	108,860	45,493	+139.5	63,367	4.40	2.30
Terraplane	5,871	8,407	4,583	57,215	38,878	+ 47.2	18,337	2.32	1.96
Studebaker	2,601	5,457	3,317	43,522	28,306	+ 54.0	15,216	1.77	1.43
Chrysler	4,259	5,725	3,443	40,611	32,037	+ 27.0	8,574	1.64	1.62
Packard	5,923	5,070	3,741	39,696	21,203	+ 87.3	18,493	1.60	1.07
De Soto	3,753	5,462	2,468	30,794	19,785	+ 55.9	11,009	1.24	1.00
Nash	1,698	2,153	1,702	15,921	12,116	+ 31.5	3,805	.64	.61
Hudson	1,335	1,849	1,600	15,499	15,328	+ 1.3	171	.63	.77
La Fayette	1,376	2,315	2,181	14,494	11,795	+ 22.8	2,699	.59	.60
Graham	1,329	1,925	1,570	11,746	11,609	+ 1.2	137	.47	.58
Lincoln	1,056	1,322	133	8,904	1,192	+647.0	7,712	.36	.06
Willys	1,128	1,513	860	8,770	6,890	+ 27.2	1,880	.35	.35
La Salle	853	1,024	1,056	8,138	7,805	+ 4.1	333	.33	.39
Cadillac	913	1,018	314	8,005	3,436	+133.0	4,569	.32	.17
Reo	244	354	370	2,524	2,714	− 7.0	−190	.10	.14
Auburn	98	151	415	1,538	3,948	− 61.1	−2,410	.06	.20
Hupmobile	49	92	627	1,483	5,689	− 73.9	−4,206	.06	.29
Cord	140	148	.....	856	.....	.....	856	.03	.....
Pierce-Arrow	83	70	72	558	537	+ 3.9	21	.02	.03
Miscellaneous	203	675	31	3,176	483	+557.0	2,693	.14	.02
Total	262,912	357,490	233,851	2,473,481	1,980,965	+ 25.0	492,516	100.00	100.00
Chrysler Corp.	66,573	88,789	52,946	598,171	468,462	+ 27.9	129,709	24.18	23.65
Ford and Lincoln	60,638	83,025	61,723	565,966	634,453	− 10.5	−68,487	22.88	32.03
General Motors	113,623	155,497	98,113	1,092,346	718,554	+ 52.2	373,792	44.16	36.27
All Others	22,078	30,179	21,069	216,998	159,496	+ 36.1	57,502	8.78	8.05

New Truck Registrations

	August 1936	July 1936	August 1935	Eight Months 1936	Eight Months 1935	Per Cent Change, 8 Mos., 1936 over 1935	Numerical Change, 8 Mos., 1936 over 1935	Per Cent of Total Eight Months 1936	Per Cent of Total Eight Months 1935
Chevrolet	20,931	21,553	18,554	155,908	121,358	+ 28.7	34,550	35.16	34.12
Ford	16,426	18,639	16,429	131,459	131,816	− 0.2	−357	29.65	37.06
Dodge	8,298	8,153	5,723	60,069	39,755	+ 51.1	20,314	13.55	11.18
International	6,314	7,167	5,231	48,147	34,970	+ 37.8	13,177	10.86	9.83
G. M. C.	3,070	3,501	1,312	17,906	7,101	+152.0	10,805	4.04	2.00
Diamond T	801	846	591	5,484	4,477	+ 22.5	1,007	1.24	1.26
White	503	529	236	3,663	1,970	+ 85.8	1,693	.83	.55
Reo	322	382	476	2,627	3,480	− 24.5	−853	.59	.98
Mack	434	492	145	2,463	1,020	+141.5	1,443	.56	.29
Studebaker	320	361	264	2,184	1,488	+ 46.5	696	.49	.42
Plymouth	253	320	110	2,087	414	+405.0	1,673	.47	.12
Federal	251	280	219	1,962	1,366	+ 44.0	596	.44	.38
Willys-Overland	218	270	253	1,630	1,409	+ 15.8	221	.37	.40
Terraplane	204	242	77	1,461	511	+186.5	950	.33	.14
Brockway	163	207	143	1,163	783	+ 48.8	380	.26	.22
Indiana	132	219	118	1,116	364	+207.0	752	.25	.10
Autocar	139	137	91	822	588	+ 40.0	234	.19	.17
Stewart	126	132	94	819	506	+ 61.8	313	.18	.14
Divco	65	52	46	689	225	+206.0	464	.16	.06
F. W. D.	26	32	17	252	138	+ 82.9	114	.06	.04
Sterling	39	22	9	155	114	+ 36.0	41	.03	.03
Twin-Coach	2	4	20	84	97	− 13.3	−13	.02	.06
Miscellaneous	185	155	197	1,249	1,711	− 27.0	−462	.27	.48
Total	59,222	63,695	50,355	443,399	355,661	+ 24.7	87,738	100.00	100.00

August Canadian Sales 10% Above Last Year

Retail sales of new motor vehicles in Canada continue well in advance of 1935 levels. During August, 1936, there were 5894 cars, trucks and buses sold for $6,172,045. These figures indicate a gain of 9.9 per cent in number and 12.3 per cent in value, as compared with August, 1935, when 5365 vehicles retailed at $5,496,913.

The total number of vehicles sold in Canada during the eight-month period, January to August, amounted to 88,975, as against 80,895 for the corresponding period last year, an increase of 10 per cent.

Passenger car sales numbered 4407, a gain of 11.6 per cent over the August 1935 total, 3950. The retail value of these cars amounted to $4,573,338, or a gain of 12.4 per cent over August, 1935. Ontario was far ahead of all other provinces as the outstanding passenger car market, with 50.9 per cent of the Dominion total. Quebec ranked second with 17.2 per cent. The best relative improvement, as compared with August last year, was shown by the province of Manitoba with a gain of 36.1 per cent in number of new cars sold. Saskatchewan showed a percentage gain of 29.0; Quebec, 22.9; British Columbia, 17.8; the Maritimes, 10.9; Ontario, 6.9; while Alberta sales declined by 13.6 per cent.

August truck and bus sales were 5.1 per cent higher in number and 11.9 per cent higher in retail value than sales effected during August a year ago. There were 1487 trucks and buses sold for $1,598,707, as compared with 1415 for $1,428,766 in August, 1935. Ontario was also the largest purchaser of trucks and buses, with 33.9 per cent of the Dominion total, while 14.1 per cent went to Quebec. In the commercial car field, Saskatchewan led the provinces with an 18.5 per cent gain over last year, in number of vehicles sold. Manitoba increased by 13.2 per cent; Ontario, 12 per cent; and British Columbia, 11.1 per cent. Quebec, Alberta and the Maritimes recorded declines of 10.3 per cent, 8.8 per cent and 0.5 per cent respectively.

Maintenance Men Meet

Independent Operators Discuss Compulsory State Inspection Laws

With informal and forum discussions on matters affecting maintenance the International Garage & Maintenance Association held its second annual convention in Chicago last week. About 75 independent garage operators attended the sessions.

Among the subjects discussed were compulsory state and municipal safety inspections and regulations. The discussions concerned the part which independent garages and service stations may play in these campaigns.

The following officers were reelected: president, Charles B. Berg, Kansas City, Mo.; vice-presidents, Frank Domina, Providence, R. I.; Austin Gailey, New York City; Al C. Gordon, Cleveland; L. G. Wilcox, Minneapolis; Phil Crutcher, Louisville, Ky.; Manley Harris, San Francisco, and Don Herr, Indianapolis; secretary, William Enzweiller, Chicago; treasurer, Herman Koppelman, Indianapolis; executive secretary, E. T. Sadler, Chicago; counsel, V. M. Armstrong, Indianapolis, and chairman of board, Don Herr, Indianapolis.

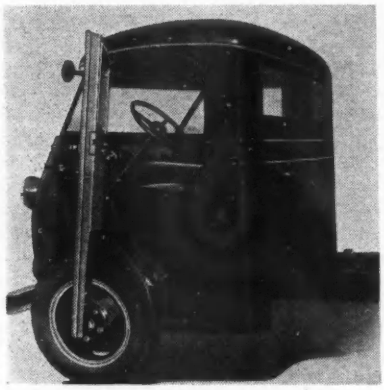
Fire-Apparatus Output Gains

Production of motorized fire-fighting equipment in the United States was 69 units for August and 67 units for July, compared with 38 units in August of 1935, according to the Bureau of the Census. Total production of this type of equipment for 1936 to the end of August was 425 units, against 314 for the first eight months of 1935.

Dodge Conversion Unit

Montpelier Cab-over-Engine to Sell from $1,145

Dodge Division, Chrysler Corp., is offering a Montpelier de luxe cab-over-engine conversion which is available on Dodge LF Series 1½-ton heavy-duty chassis in all standard wheelbases and in special wheelbases from 108 in. up. The 129½ in. wheelbase unit, for example, offers a back of cab to rear axle dimension of approximately 81 in. which is recommended to accommodate a 12 ft. body. The cab-over-engine unit on the 162 in. wheelbase chassis with cab-to-axle dimension of 114 in.



Cab of the Dodge conversion unit by Montpelier

is suitable for 15 ft. or 16 ft. bodies.

The base price starts at $1,145 f.o.b. factory for the conversion and cab mounted on the Dodge LF 35 chassis. This price includes special heavy-duty features such as: heavy front bumper, 18-gal. fuel tank, oil bath, oil cleaner, underslung tire carrier, large radiator core, and heavier front springs and front end construction. Standard tire equipment includes 32 x 6, 8-ply front and dual rear of the same size. The base price also includes delivery of chassis by trailer to Montpelier.

British Motor Sales Up 12% in 10 Months

Sales of motor vehicles in Great Britain and Northern Ireland increased 12.5 per cent during the 10 months' period from October, 1935, to July, 1936, inclusive, according to figures compiled by the Ministry of Transport. Passenger cars showed a slightly greater gain than did commercial vehicles. Detailed figures follow:

	July		Total Ten Months	
	1936	1935	1936	1935
Gt. Britain.				
Cars	24,973	22,636	260,197	230,421
*Goods ...	6,933	5,763	65,038	58,354
Hackneys.	905	749	6,334	6,066
Total ..	32,811	29,148	331,569	294,841
N. Ireland.				
Cars	511	373	5,440	4,472
*Goods ...	146	93	1,293	1,219
Hackneys.	39	6	120	43
Total ..	696	472	6,853	5,734
Grand Total	33,507	29,620	338,422	300,575

40 Years Ago

—with the ancestors of AUTOMOTIVE INDUSTRIES

The great road race for motor vehicles from Paris to Marseilles and return (1051 mi.) has been run and won by the Daimler motors as it was last year when over the course from Paris to Bordeaux and return, Panhard & Levassor and Peugeot Freres, came in for the chief prizes.

The course of 1896 differed in many respects from that of 1895. It was over 300 mi. longer and continuous runs were abolished, the course being divided into 10 stages, five out and five in. Thus the conditions more nearly approached those a motor carriage might encounter in general touring.

So far as the mechanical lessons of the course are concerned there appear to be none new to the well-informed American student. The hot tube ignition long since revealed its disadvantages for road motors. . . . It is likely that the electric ignition will grow in favor in France.

The tire question is a vexed one with the French builders. It is said that the pneumatics were punctured more often than one could wish, and the solid tires were badly cut up at the end of the journey.

—From *The Horseless Age*, Oct., 1896.

Dissenting Voice

Asks Court for Permission to Appeal Willys Reorganization Plan

Edward D. Hoffman, Akron, who said he is the holder of 2800 shares of Willys-Overland common and 700 shares of preferred stock, has filed a petition in Federal court in Toledo and also before the circuit court of appeals in Cincinnati asking permission to appeal the decision of Judge George P. Hahn of Federal district court in the Willys-Overland reorganization case. The court will meet Oct. 6 in Cincinnati but efforts will be made to get an earlier hearing to dispose of the case if possible.

David R. Wilson, trustee, and Empire Securities, Inc., which filed the reorganization plan, will contest the application.

Rights to subscribe to stock of Willys-Overland Motors, Inc., expired Oct. 2. Oct. 5 is the deadline for payments to be made on subscriptions to the new stock. Oct. 10 is the date on which notice will be given to underwriters of the portion of the 309,050 units not subscribed.

R. J. Archer, head of the Willys Export Corp., to be a subsidiary under the new company, declared foreign sales would probably be double in 1937 over the current year's shipments abroad. He said the first eight months of this year had shown 60 per cent gain over exports for the same period last year.

Passenger Car Production by Wholesale Price Classes

(U. S. and Canada)

First Eight Months 1936 and 1935 Compared

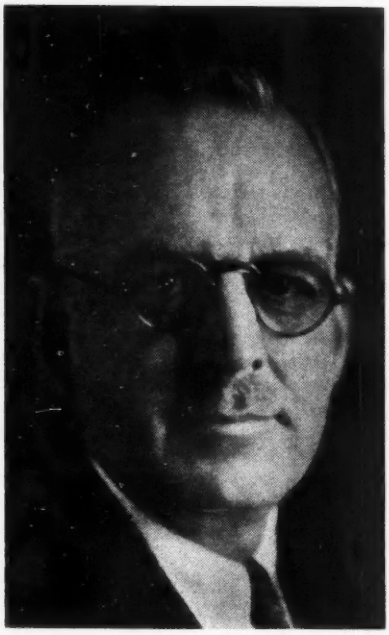
	1936	1935	Per Cent Change	Per Cent of Total 1936	Per Cent of Total 1935
$500 and Under	1,509,625	1,456,639	+ 3.8	55.40	60.53
$501-$750	1,098,063	860,193	+27.6	40.30	35.74
$751-$1000	81,331	64,799	+25.5	2.98	2.69
$1001-$1500	26,175	14,067	+86.1	.96	.58
$1501-$2000	6,517	5,780	+12.8	.24	.24
$2001-$3000	2,946	3,295	−10.5	.11	.14
$3001 and over	253	1,903	−86.8	.01	.08
Total	2,724,910	2,406,676	+13.1	100.00	100.00

Commercial Vehicle Production by Capacities

(U. S. and Canada)

First Eight Months 1936 and 1935 Compared

	1936	1935	Per Cent Change	Per Cent of Total 1936	Per Cent of Total 1935
1½ tons and less	559,906	483,300	+16.0	93.73	94.17
2 to 3 tons	26,945	22,801	+18.1	4.51	4.44
3½ tons and over	5,587	4,160	+34.2	.94	.81
Special and buses	4,901	2,963	+65.5	.82	.58
Total	597,339	513,224	+16.5	100.00	100.00



E. H. McCarty
Will Resign

McCarty to Resign

Nash President to Sever All Connection with Company

Resignation of E. H. McCarty as president and director of Nash Motors Co. to be effective sometime before the end of the fiscal year, Nov. 30, was announced today by C. W. Nash, chairman of the board. No successor has been appointed pending decision as to the date of Mr. McCarty's retirement and no statement was issued by Mr. McCarty as to his future activities.

The Nash Motors Company organization throughout the country was advised of the action started by Mr. McCarty more than two months ago, in a letter from Mr. Nash. This read: "On July 8, 1936, Mr. E. H. McCarty tendered his resignation as president and director of the Nash Motors Company, the same to take effect at the option of the chairman of the board but not later than the end of the fiscal year 1936.

"In presenting his resignation, Mr. McCarty explained that he had given careful consideration to his action and was fully determined to make this move.

"Mr. McCarty has been associated with the company over 14 years filling the position as sales manager and director of sales for 7 years and occupying the position as vice-president and general manager and then as president of the company during the remainder of the time.

"It is needless to say that the action of Mr. McCarty is regretted sincerely by every member of the Nash organization. Mr. McCarty has been associated with this company for so many years that he has become a real factor in the company and he could not sever his connection without causing severe disappointment to all concerned."

New Nash Line

A completely restyled line of cars will be presented by Nash Motors Co. for 1937, it was revealed at a special preview of the new models in Kenosha, this week. "We've got bigger and finer cars for less money," said C. W. Nash, chairman of the board.

The company has spent over a million dollars for new dies, not one piece of sheet metal being taken from the 1936 line. Several important mechanical changes, particularly in the La-

(Turn to page 455, please)

A. J. Brosseau

President of Mack Represented Company in Many Activities

A. J. Brosseau, who died last week, had injected the impetus of a forceful and colorful personality into many aspects of the truck building industry. To many persons outside the industry his name was the first to come to mind in seeking a figure to identify commercial-vehicle activity.

He represented Mack in the Automobile Manufacturers Association, was chairman of the motor-truck committee of the association, and in turn represented the association on the National Industrial Conference Board. In earlier years, he was the delegate of the association to the International Chamber of Commerce, and had served the Chamber of Commerce of the U. S. A. as member of a special committee to submit recommendations for simplifying the procedure of the Patent Office.

Roy E. Cole
Becomes vice-president in charge of Studebaker engineering

Cole and James

Promoted by Studebaker to Vice-President and Chief Engineer Respectively

Paul G. Hoffman, president of the Studebaker Corporation, has announced the appointment of Roy E. Cole as vice-president in charge of engineering and of William S. James as chief engineer. Both appointments were made by the board of directors at a meeting held in South Bend, Friday. Mr. Cole succeeds D. G. Roos, who resigned July 31. He has been associated with the motor industry for a number of years. In 1924 he joined Dodge Motor Company as chief engineer. When Rockne Motors was formed by Studebaker in 1931 Cole became chief engineer for the organization and he returned to the parent company two years later. Since 1931, when his association with Studebaker began, he has been active in the design of the company's products. Mr. James' connection with the automobile industry began in 1924 when he joined the research engineering department for the Hupmobile. Later he became assistant technologist for the Associated Oil Company and came to Studebaker in 1926 as head of the research engineering department.

His nomination as a vice-president of the Society of Automotive Engineers is announced elsewhere in this issue.

:SLANTS:

GHOST LAID—*Litigation which has dragged through Canadian courts for 27 years relative to the sale in 1909 of a White Steamer has finally been settled. Action for $10,000 was begun when the first car shipped to Canada developed such defects, it was alleged, that the agents claimed damages from the makers. Judgment by default was obtained but was not executed until 1931 as the White Co. had no assets in the Dominion. The matter was appealed and further legal complications injected until last month when a settlement was reached out of court, the terms of which have not been made public.*

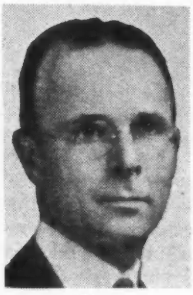
SAFETY SLANT—*Pontiac's field staff (328 men) drove 9,000,000 miles without a fatal accident in the 9-month period ending June 30. All accidents reported numbered 80, for an average of 112,500 miles per accident. Continuous, systematic safety education is credited for the record.*

SWORD TO PLOUGH—*After a period devoted entirely to military production, Boeing Aircraft has begun development work for Pan-American Airways on a transoceanic "clipper" ship project. New floor space gives Boeing 400,000 sq. ft. as the project gets under way.*

S.A.E. Nominates General Officers for 1937

Beecroft

Colwell


Keys

Stewart

Weick

Beall

Pope

Baxley

James

Keith

Orr

Johnson

Photographs of L. L. Williams and Elmer McCormick were not received in time for publication in this issue.

S.A.E. Nominates

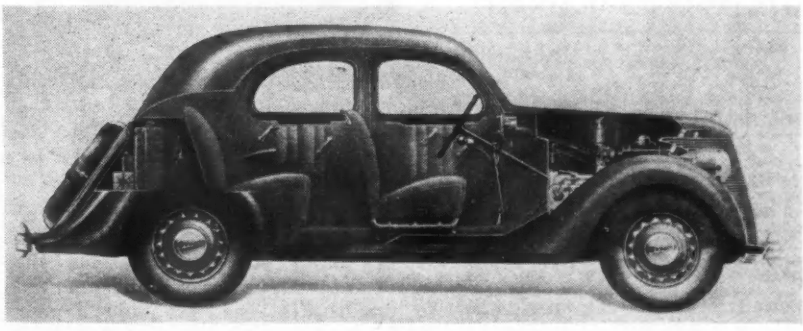
(Continued from page 427)

professional activities they will represent on the S.A.E. Council are: Representing aircraft engineering — Fred E. Weick, senior aeronautical engineer, National Advisory Committee for Aeronautics; aircraft-engine engineering—A. L. Beall, research engineer, Wright Aeronautical Corp.; Diesel engines—A. W. Pope, Jr., research engineer, Waukesha Motor Co.; fuels and lubricants—C. Herbert Baxley, staff engineer, Socony-Vacuum Oil Co.; passenger car—W. S. James, chief engineer, Studebaker Corp.; passenger-car bodies — L. L. Williams, Cleveland Heights, Ohio.; production — R. R. Keith, manager, tractor works, J. I. Case Co.; tractor and industrial power equipment — Elmer McCormick, chief engineer, John Deere Tractor Co.; transportation and maintenance—John M. Orr, general manager, Equitable Auto Co., Pittsburgh; and truck, bus and railcar—Stephen Johnson, Jr., chief engineer, Bendix Westinghouse Automotive Air Brake Co.

Continuing on the 1937 S.A.E. Council will be Joseph A. Anglada, consulting engineer, New York; Louis Schwitzer, president, Schwitzer-Cummins Co., and Alex Taub, development engineer, Chevrolet Motor Co., who were elected at the beginning of 1936 for two-year terms.

Also on the council will be William B. Stout, president, Stout Engineering Laboratories, Inc., as past-president of the Society, and Ralph R. Teetor, in charge of engineering, Perfect Circle Co., as retiring president of the Society.

Results of mail ballot on the nominations will be announced at the annual dinner in New York, Nov. 12.



First photograph from Europe of the new Ford 22-hp. car. Phantom view shows positioning of interior units. To many observers this car seems a prototype of a Ford introduction for the 1937 domestic market

GORDON M. BUEHRIG, chief body designer of the Auburn-Cord factory, has resigned, it became known this week. Mr. Buehrig was formerly with General Motors. He is credited with designing the bodies of the present Cord car.

CLAUS ANDERSON has been appointed Canadian sales manager for Nash Motors Co. He has had supervision of the Canadian business of Nash since 1935.

MAJ. LESTER D. GARDNER, secretary of the Institute of the Aeronautical Sciences, who was a passenger on the airship "Hindenburg" leaving Lakehurst last Wednesday evening, will continue his flight on arrival in Germany directly to Moscow. He plans to arrive there on Sunday afternoon. Later, Major Gardner will visit the new aeronautical laboratories in Rome, Paris, Berlin and London.

Al P. Witteman, formerly with Nash Motors and for the past ten years with the Falk Co., Milwaukee, has joined the sales organization of Leland-Gifford Co., Worcester, Mass., in charge of its Cleveland territory.

Steel Famine Believed Impossible

Hand-to-Mouth Buying May Go Overboard As Output Is Pushed by Automotive Delivery Requirements

By William Crawford Hirsch

A good deal of steel requirement of automotive consumers, especially in finished automobile sheets, has been ordered with view to securing prompt shipment when needed. Considerable new business from car manufacturers and parts makers, it is thought, will be placed in the next two months.

This propitious outlook has led some of the finishing mills to make inquiry among their customers as to the probable extent of their last quarter requirements, not, as one exaggerated report had it this week, with a view to rationing or allocating supplies, but solely to facilitate rational production schedules. Considerable in the way of expanding output is possible if conditions warrant. Talk of a steel famine falls loosely, but with the rate of ingot output this week reported by the American Iron and Steel Institute at only 75.4 per cent and finishing capacity impressively enhanced through addition after addition of automatic rolling mills in the last few years, so extreme a condition is not believed possible. Here and there tight spots in raw material supplies are uncovered; for a time paucity in the scrap market was emphasized, but this is easing off and now coke is referred to as the neck of the bottle.

Profitable steel mill operations are possible only when production schedules can be formulated not from day to day, but for weeks, if not months in advance. Many consumers have become so inured to the habit of buying from hand-to-mouth that they have lost sight of this. Now, it would seem demand is so shaping itself that, while there is not likely to be a return to the old system of contracting for a quarter or longer in advance, mills will be in a position to insist upon better cooperation from their customers than when the latter would furnish specifications today and expect to have the steel shipped to them the day after.

Pig Iron—Automotive foundries are more to the front as buyers in the Middle West markets, some sizeable transactions being reported. Prices remain unchanged, but intermittent predictions persist of an advance next quarter.

Aluminum—Both primary and secondary markets rule steady and unchanged.

Copper—Producers take the view that

(*Turn to page 456, please*)

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—August

	UNITS					ESTIMATED DOLLAR VOLUME*				
				Per Cent of Total					Per Cent of Total	
	1936	1935	Per Cent Change	1936	1935	1936	1935	Per Cent Change	1936	1935
Chevrolet, Ford and Plymouth	172,823	162,018	+ 6.8	65.78	69.29	$104,000,000	$97,000,000	+ 7.3	57.27	61.42
Others under $750	39,303	34,448	+ 14.3	14.96	14.73	28,300,000	24,400,000	+ 16.0	15.58	15.45
$751-$1000	36,972	29,013	+ 27.5	14.07	12.41	31,000,000	24,500,000	+ 26.6	17.07	15.52
$1001-$1500	11,605	7,183	+ 61.8	4.42	3.07	13,200,000	8,300,000	+ 59.0	7.27	5.26
$1501-$2000	717	87	+725.0	.27	.04	1,300,000	200,000	+665.0	.72	.13
$2001-$3000	868	723	+ 20.0	.34	.31	2,200,000	2,000,000	+ 10.0	1.21	1.27
$3001 and over	421	348	+ 21.0	.16	.15	1,600,000	1,500,000	+ 6.8	.88	.95
Total	262,709	233,820	+ 12.6	100.00	100.00	$181,600,000	$157,900,000	+ 15.1	100.00	100.00
Miscellaneous	203	31	.....							
Total	262,912	233,851	+ 12.6							

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—Eight Months

	UNITS					ESTIMATED DOLLAR VOLUME*				
				Per Cent of Total					Per Cent of Total	
	1936	1935	Per Cent Change	1936	1935	1936	1935	Per Cent Change	1936	1935
Chevrolet, Ford and Plymouth	1,610,055	1,370,810	+ 17.2	65.19	69.22	$971,100,000	$842,000,000	+ 15.3	56.98	61.71
Others under $750	358,515	283,262	+ 26.9	14.51	14.30	258,200,000	202,100,000	+ 28.0	15.15	14.81
$750-$1000	386,727	257,791	+ 50.3	15.65	13.01	322,100,000	218,200,000	+ 47.8	18.90	15.99
$1001-$1500	98,680	54,820	+ 80.0	3.99	2.77	112,900,000	64,700,000	+ 74.5	6.62	4.74
$1501-$2000	7,359	4,659	+ 57.9	.30	.24	12,800,000	7,900,000	+ 62.1	.75	.58
$2001-$3000	5,762	6,166	− 6.5	.23	.31	14,800,000	17,000,000	− 12.9	.87	1.25
$3001 and over	3,213	2,995	+ 7.1	.13	.15	12,500,000	12,600,000	− 0.8	.73	.92
Total	2,470,311	1,980,503	+ 24.9	100.00	100.00	$1,704,400,000	$1,364,500,000	+ 25.0	100.00	100.00
Miscellaneous	3,176	483	.....							
Total	2,473,487	1,980,986	+ 25.0							

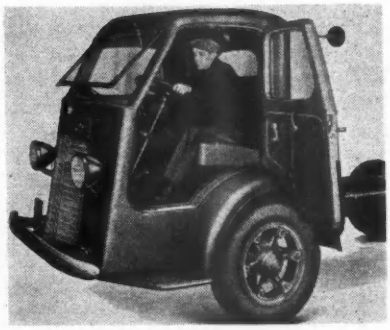
*All calculations are based on list price F.O.B. factory of the five-passenger, four-door sedan in conjunction with actual new car registrations of each model. The total dollar volume for the different models is then consolidated by price classes.

IHC Shorter Model

Cab-Over-Engine Design Clips 3 Ft. from Chassis

1½-ton cab-over-engine truck, Model C-300, has been announced by the International Harvester Co. The driver is seated directly over the engine and all heat and fumes are said to pass out beneath the seat at the rear of the cab. This new model is available in two lengths of wheelbase, 99 and 117 in., and is adapted to body lengths up to 15 ft. As compared with trucks of the conventional type and adapted to take bodies of the same length, it saves approximately 3 ft. in overall length. This cab-over-engine design also makes it possible to achieve the desirable weight distribution of one-third on front and two-thirds on rear wheels.

The powerplant is of the six-cylinder L-head type, 3 5/16 in. bore and 4⅛-in. stroke. It develops 78.5 b. hp. at 3400 r.p.m., and a maximum torque of 151 lb.-ft. at 800 to 1400 r.p.m. Piston displacement is 213 cu. in. and the compression ratio 5.7. The four main bearings and the connecting-rod bearings are of the steel-backed, babbitt-lined, replaceable-shell type. Other engine features include hardened exhaust-valve seat inserts, improved manifolding, a single-venturi, horizontal-type carburetor, wire-wool type air cleaner, and vacuum spark control. The clutch is of the single-plate type.

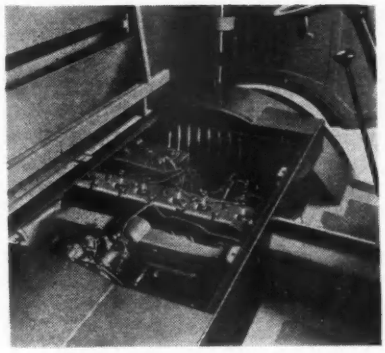


Driver is seated directly over engine in this IHC truck

For major service operations the powerplant can be lowered and removed to underneath the cab and frame. Such minor service operations as tappet adjustments and work on the fuel and ignition systems can be effected after removing a heat-insulated cover plate in the seat box. Water pump and other

assemblies can be serviced after removing the floor boards. The 18-in., four-blade radiator fan is driven through an extension shaft directly from the engine crankshaft. The location and mounting of the fan are said to be such that not only is proper air circulation over and around the engine assured, but the entrance of engine heat into the cab is prevented.

International Model C-300 has a "streamlined" cab with sloping two-piece V-type windshield and unusually wide doors. The cab is of composite construction, with wood frame and sheet-metal paneling. Doors and other portions of the cab are heat- and noise-insulated. Each windshield section is



View with the raised in IHC cab-over-engine model

mounted on two concealed hinges at the top and swings outward at the bottom. There is a hinged ventilator at the driver's side and this is balanced on the opposite side by a hinged cover over an opening which affords access to the radiator filler.

All metal parts of the cab that are immediately above the engine, including the seat box, seat-box cover, and floor tunnel, are built of two pieces of sheet metal, between which is a ¾-in. thickness of heat-insulating material to reduce the possibility of heat being conducted from the engine into the cab. Floor and toe boards are of wood and covered with a thick rubber mat.

Canadian Financing Up

Volume and Amount Gain for Month of August

A gain of 22.6 per cent in volume and 26.1 per cent in amount was shown in financing of motor vehicles in Canada during August compared with the corresponding month last year. Motor vehicles financed in August totaled 11,136, and the amount of financing was $4,293,329 against 9081 at $3,404,783 in August, 1935. New motor vehicles totaled 3061 at $2,203,440 compared with 2371 at $1,692,405 in August last year, and used motor vehicles numbered 8075 at $2,089,889 against 6710 at $1,712,378. In the eight months ended August 31 motor vehicles financed totaled 101,276 at $40,954,944 against 75,515 at $30,651,397 in the corresponding period last year.

The Carborundum Co., Detroit, offers a new catalog entitled **"Precision Grinding."** It discusses general grinding principles and their application. Several product bulletins are included.*

A new Bristol Process **Cycle Controller** is described in bulletin No. 447 issued by the Bristol Co., Waterbury, Conn.*

Springs for all purposes are described in a booklet* of the Wm. D. Gibson Co., Chicago, Ill. Useful tables are appended.

A **Handbook of Welded Steel Tubing*** has been issued by the Michigan Steel Tube Products Co., Detroit. This excellent little book contains information on application: physical, chemical and metallurgical properties; commercial tolerance limitations and related engineering data.

Bulletin HD-636 just published by the Hevi Duty Electric Co., Milwaukee, Wis., describes the construction of their **Hevi Duty Furnace Element.***

John Waldron Corp., New Brunswick, N. J., recently brought out bulletin No. 71 which describes the Waldron **Gears** and contains information for selecting sizes.*

Bulletin No. 12, recently brought out by Diamond Chain & Mfg. Co., Indianapolis, describes and illustrates the improved **Diamond flexible coupling** line.*

The Carpenter Steel Co., Reading, Pa., offers users of alloy steel a new and attractive booklet entitled **Alloy Steels Simplified.***

A 48-page booklet, prepared by Bakelite Corp., N. Y., describes characteristics, properties and applications of **Bakelite Molded.***

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has just released **steam turbine bulletin No. 1179** which contains detailed description of the company's condensing automatic extraction turbine frames for the capacity range of 500 to 5000 kw.*

* Available from AUTOMOTIVE INDUSTRIES.

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Calendar of Coming Events

SHOWS

30th Automobile Salon, Paris, France, Oct. 1-11
Olympia Motor Show, London, England, Oct. 15-24
Czechoslovakia, 26th International Automobile Exposition, Prague....Oct. 16-25
9th International Automobile Salon, Milan, Italy .....November
National Motor Truck Show (N. J. Motor Truck Assn.), Newark, N. J., Nov. 3-7
Canadian National Automobile Show, Toronto .....Nov. 7-14
National Automobile Show, Grand Central Palace, New York .....Nov. 11-18
Omaha Automobile Show.....Nov. 11-15
Philadelphia Automobile Show..Nov. 12-19
Scottish Motor Show, Glasgow..Nov. 13-21
International Aviation Show, Paris, France .....Nov. 13-29
Columbus Automobile Show.....Nov. 14-20
Boston Automobile Show.....Nov. 14-21
Buffalo Automobile Show.....Nov. 14-21
Chicago Automobile Show.....Nov. 14-21
Detroit Automobile Show.....Nov. 14-21
New Haven Automobile Show...Nov. 14-21
Indianapolis Automobile Show...Nov. 14-21
Washington, D. C., Automobile Show, Nov. 14-21
Cincinnati Automobile Show....Nov. 15-21
St. Louis Automobile Show.....Nov. 15-22
Pittsburgh Automobile Show....Nov. 16-21
Brooklyn Automobile Show.....Nov. 21-28
Cleveland Automobile Show.....Nov. 21-28
Montreal Automobile Show.....Nov. 21-28
Kansas City Automobile Show..Nov. 21-29
Milwaukee Automobile Show....Nov. 22-29
Portland Automobile Show.....Nov. 22-29
Baltimore Automobile Show.Nov. 26-Dec. 5
28th Automobile Salon, Brussels, Belgium .....Nov. 28-Dec. 9
Peoria Automobile Show...Nov. 30-Dec. 5
Natl. Exposition of Power & Mechanical Engineering, Biennial Meeting, New York City .....Nov. 30-Dec. 5
First International Consumers Petroleum Exposition, Convention Hall, Detroit Dec. 5-13
Automotive Service Industries Joint Show, Chicago .....Dec. 9-13
Illinois Automotive Ass'n, 4th Annual Show and Maintenance Exhibit, Navy Pier, Chicago.....Apr. 24-28, 1937

CONVENTIONS AND MEETINGS

25th National Safety Congress and Exposition, Atlantic City.....Oct. 5-9
North American Gas Tax Conference, Richmond, Va. .....Oct. 6-9
S. A. E. Fuels and Lubricants Regional Meeting, Dallas, Tex.....Oct. 8-9
5th Nat'l Road Oil and Asphalt Congress, Tulsa, Okla. .....Oct. 8-9
National Association of Lubricating Grease Manufacturers, 4th Annual Convention, Chicago .....Oct. 12-15
Annual Meeting of the National Association of Motor Bus Operators, Detroit, Mich. .....Oct. 15-16
National Battery Manufacturers Assoc., 12th Annual Convention, Chicago, Ill. .....Oct. 15-16
First Aircraft Production Meeting of the S. A. E., Los Angeles...Oct. 15-17
American Trucking Associations, Inc., Third Annual Convention, Chicago, Oct. 19-21
American Society for Metals, 18th Nat'l Congress, Cleveland, O.....Oct. 19-23
16th Annual Meeting of the American Welding Society, Cleveland, O., Oct. 19-23
American Gas Association, Annual Meeting, Atlantic City.....Oct. 26-31
American Foundrymen's Ass'n Conference on Foundry Practice, Univ. of Iowa, Iowa City, Ia.....Oct. 30-31
American Petroleum Institute, Annual Meeting, Chicago .....Nov. 9-12
Society of Automotive Engineers Annual Dinner, New York.....Nov. 12
International Day, National Automobile Show, New York .....Nov. 16
National Foreign Trade Convention, Chicago .....Nov. 18-20
16th Annual Meeting, Highway Research Board of the National Research Council, Washington, D. C. ..Nov. 18-20
International Acetylene Assn., 37th Annual Convention, St. Louis, Nov. 18-20
Natl. Industrial Traffic League, Annual Meeting, New York City....Nov. 19-20
Tin Can Tourists' Get-Together Meeting, Lake City, Fla. .....Nov. 22-28
Tin Can Tourists' Homecoming, Arcadia, Fla. ....Dec. 28, 1936-Jan. 3, 1937
S. A. E. Annual Meeting, Detroit, Mich., Jan. 11-15, 1937
Tin Can Tourists' Winter Convention, Clearwater, Fla. ..Jan. 29-Feb. 8, 1937
Tin Can Tourists' Annual Convention, Sarasota, Fla. .....Feb. 8-14, 1937

CONTESTS

First Annual 400-Mile International Sweepstakes, Roosevelt Raceways, L. I. .....Oct. 12
500-Mile International Sweepstakes, Los Angeles Raceway .....Nov. 29

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES

General business activity continued to improve last week, and one weekly trade index registered a new high for the year. Retail sales ranged from 10 to 15 per cent above those in the corresponding period last year, while the volume of wholesale business showed an increase of about 15 per cent.

The Guaranty Trust Company's index of wholesale commodity prices on September 15 was 59.7, as against 58.9 a month earlier and 54.2 a year earlier. The company's index of business activity for August stood at the preliminary figure of 86.8 as compared with 89.0 the month before and 72.5 a year ago.

Car Loadings Gain

Railway freight loadings during the week ended September 19 totaled 789,510 cars, which marks an increase of 89,651 cars above those during the preceding week, a gain of 82,690 cars above those a year ago, and a rise of 145,012 cars above those two years ago.

Power Production at New High

Production of electricity by the electric light and power industry in the United States during the week ended September 19 reached a new high for this year and was 17.2 per cent above that in the corresponding period last year.

Lumber Firm

Production of lumber during the week ended September 12 was 65 per cent of the 1929 weekly average. New business was at about the same level as in the preceding week, while shipments and production were somewhat higher.

Crude Oil Steady

Average daily crude oil production during the week ended September 19 amounted to 3,037,000 barrels, as against 3,020,850 barrels for the week before and 2,774,500 barrels a year ago.

Coal Production Jumps

The average daily output of bituminous coal during the week ended September 12 was 13.8 per cent above that in the preceding week. Production of anthracite amounted to 718,000 tons, as compared with 531,000 tons in the corresponding period last year.

Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended September 26 stood at 84.0, as compared with 84.1 the week before and 84.2 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended September 23 showed a decline of $1,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and of government securities remained unchanged. Money in circulation declined $16,000,000, and the monetary gold stock increased $24,000,000.

Hudsons Previewed

Largest Dealer Group Ever Gathered Sees Four New Lines of Cars

Four completely new lines of Hudson built cars—Hudson Eights and Sixes, the six-cylinder Terraplane, and a line of new super Terraplanes were unveiled for distributors Tuesday at a business session at the Masonic Temple in Detroit. Attended by distributors from every State and many foreign countries, it was the largest convention ever held by Hudson.

In addition to new styling, chief changes in the models are that they are longer, lower and wider, offer more interior room and riding comfort and through mechanical advances are both more powerful and more economical in operation.

The preview revealed a number of engineering contributions for greater motoring safety and easier driving. Hudson's electric hand gear shifter, now in use on 90,000 Hudson built cars, again is optional equipment both on Hudson and Terraplane models. It will be used in connection with a new mechanical development.

Practically all of the distributors are reported to have been sold out on 1936 cars before coming to Detroit. Some had scored sales increases of more than 100 per cent over their 1935 volume in what was Hudson's biggest year since the automobile boom years.

W. R. Tracy, vice-president in charge of sales, reported a gain for Hudson of 36.4 in the first seven months of this year against an industry gain of 26.3. In Miami, Hudson built cars showed a gain of 184.6 per cent against 47.2 for the industry. In Birmingham, Ala., 122.9 per cent against 26.7. In Seattle, 100 per cent against 55.9 per cent. A total of 1228 new dealers joined the company during the 1936 model year.

S.A.E. Enters Texas

Two-Day Regional Meeting to be Held at Exposition

A two-day regional meeting, with 5 technical sessions will be held in Dallas, Tex., Oct. 8 and 9 by the Society of Automotive Engineers. Technical sessions will be held at the General Motors Building, Texas Centennial Exposition.

B. E. Sibley, chief technologist, Continental Oil Co., is chairman of the arrangements committee. The announced program follows:

THURSDAY, OCT. 8

MORNING SESSION—10:00 A. M., F. M. Young, Chairman

"Variable Transportation Problems of the World," A. W. S. Herrington, Marmon-Herrington Co.; "Auxiliary Automotive Equipment Used in Oil Field Work," C. P. Parsons, vice-president, Halliburton Oil Well Cementing Co.

AFTERNOON SESSION—2:00 P. M.

"Trip through the Texas Centennial Exposition," Harry Olmsted, Chairman.

EVENING SESSION—7:00 P. M., A. J. Kean, Chairman

Dinner at Adolphus Hotel

"As the S.A.E. Advances," John A. C. Warner, S.A.E. general manager; "Oil Bath Automotive Type Cleaners," R. F. Norris, Burgess Laboratories.

FRIDAY, OCT. 9

MORNING SESSION—10:00 A. M., T. B. Rendel, Chairman

"Economic Place of Automotive Oil Engines," A. F. Campbell, Waukesha Motor Co.; "Care and Servicing of Engine Cooling Systems," F. M. Young, Young Radiator Co.

AFTERNOON SESSION — 2:00 P. M.— Captain Charles W. France, Chairman

"Problems in Air Line Operation," R. S. Damon, vice-president in charge of operation, American Airlines.

EVENING SESSION—8:00 P. M.— B. E. Sibley, Chairman

Debate between Students of Oklahoma University and Texas Agricultural and Mechanical College, "RESOLVED That the Future Holds More Possibilities for the Two Stroke Cycle Gasoline Engine than the Four Stroke Cycle for Automotive Purposes."

Tool Engineers to Meet

Semi-annual meeting of the American Society of Tool Engineers will be held in Detroit, Oct. 8. Feature of the meeting will be showing of a sound film titled "Men and Machines," which records industrial progress in the United States.

Just Among Ourselves

Experience Will Pilot Procedure

THE Walsh-Healey bill's going into effect this week finds the automotive industry ready to let experience dictate the procedure it will follow in bidding for government business, if a representative sampling of opinion we took this week does not reverse itself.

While wary, the attitude of large suppliers is not hopeless, as far as government business is concerned. There is a feeling, for example, that the Federal Government is no different from other buyers in this respect: that if exceptional specifications are set up for the acceptance of a product, it must be expected that it will be reflected in the purchase price.

Size of the government order and general specifications will get more attention than they have heretofore, and it is indicated that the minimum order in which a factory is interested may increase in size because of the difficulty and expense of making sure that compliance with the Walsh-Healey Act has been effected all along the line.

Larger motor-vehicle manufacturers, it is believed, will have a better chance of complying with the Act because of the percentage of their product made under the home roof. Smaller companies which make a high percentage of purchases from outside suppliers must, under the Walsh-Healey Act, certificate compliance with the Act by each supplier. In many cases, this will make it more convenient to forego the chance of the business, rather than carrying out the rigmarole which becomes necessary.

It has been suggested that dealers, whose operations are more compact, and who can usually comply with the Act, may be the chief bidders for government automotive business. One thing against this is the fact that the Government usually requires on fleet orders that a supply of replacement parts shall be available nationally for a period of three years. If the dealer bid for business, this would be his responsibility as far as the Government is interested. This could perhaps be "guaranteed" by some form of special contract between the dealer and his factory, but dealers do not seem eager to undertake such a responsibility.

The automotive industry is waiting for government bids to be advertised, and will try to solve each problem in connection with them as it arises. Further than this, no "trend" seems evident in automotive thinking about the Walsh-Healey Act.

Quick Cure for Malignancy

AS surgery remains the chief ameliorating factor in cancer, decisive action seems the best method of inhibiting the growth of malignant labor troubles. Last week in Akron the creeping paralysis which is known as the "sit-down" strike afflicted the B. F. Goodrich Company's plant.

Goodrich looked at the disease and decided to operate. Every production worker in the plant was ordered to evacuate, and peremptory notice was given that not a wheel would turn until the workers decided to return on a normal basis.

No emergency crews were hired, which meant there was no excuse for ejected workers to picket the plant. No plans were made to carry on production elsewhere. In three days production was resumed.

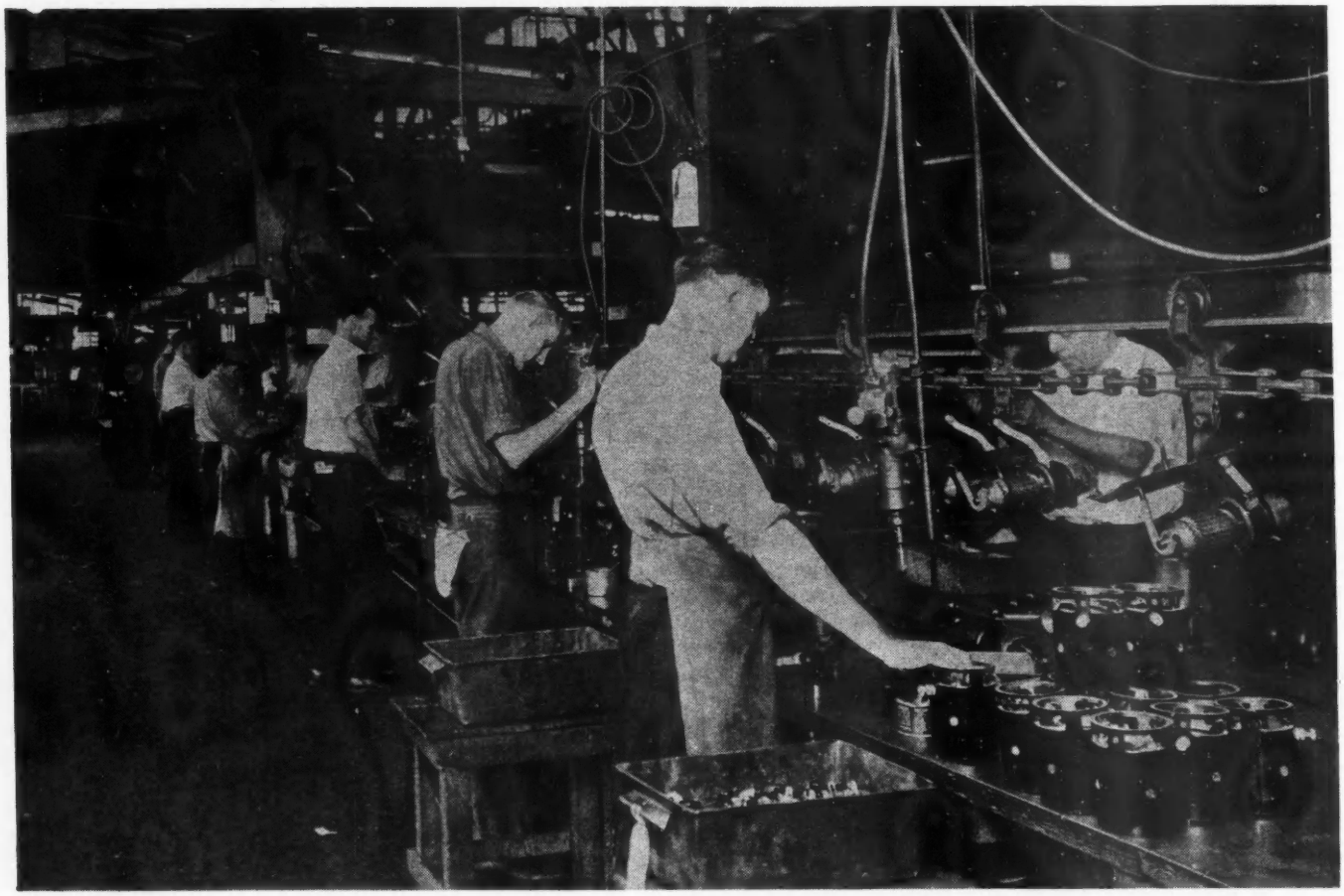
Air Conditioning? It's a Question

STIMULATED in our efforts by some improvements in the heating, ventilating, and defrosting of 1937 cars, we have been doing some quiet investigating in the last few weeks on the subject of air-conditioning—for automobiles.

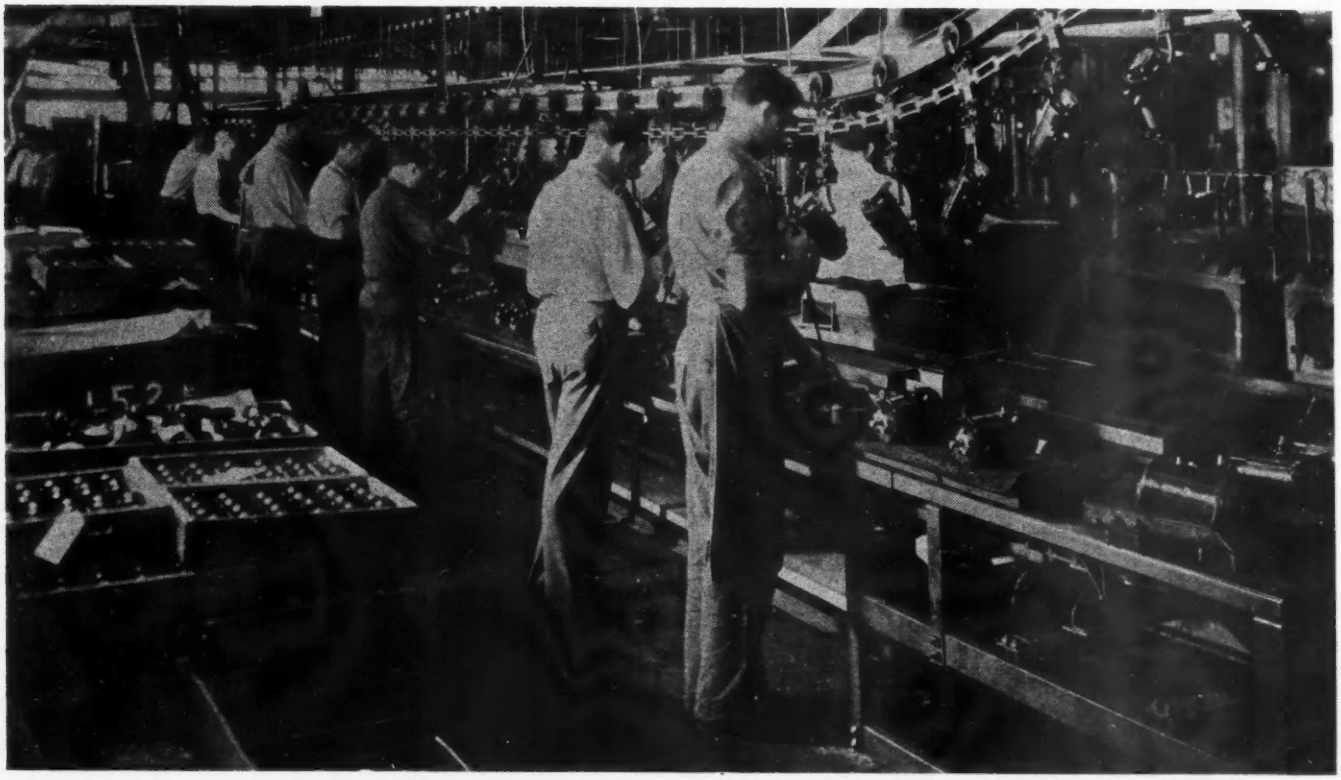
One opinion, which has been backed by considerable research, is that in the present state of the art, the cost of air-conditioning a passenger car would be prohibitive, except as a stunt—and it will be some time, the same authority believes, before cars selling for under $1,000 will be carrying much air-conditioning equipment. And it may be noted that this opinion is held in face of an approach from another organization which believed it could sell $1,000,000 worth of air-conditioning equipment for cars in the next year.

Buses seem to be another question. One large bus manufacturer has advised a manufacturer of air-conditioning equipment that if the equipment can be held within 15 per cent of the cost of a $17,000 bus, it will be commercially feasible. This is the first cost criterion we have seen on the subject, and we offer it as just that. And taxicabs, it was pointed out, may go for air-conditioning to give them a competitive advantage.

(*Turn to page 456, please*)



General view of final assembly line for starting motors. Note armature assemblies coming in on the overhead monorail which dips down to sweep over the assembly stations.



General view of large-production generator assembly line with overhead feeder conveyor

ELECTRIC AUTO-LITE

plants blanket the field with coordinated engineering and manufacturing facilities for ignition requirements anywhere.

By Joseph Geschelin

IN celebrating its 25th Anniversary as a manufacturer of ignition equipment, The Electric Auto-Lite Company, Toledo, Ohio, has made the occasion of more than historic significance by the introduction of the Auto-Lite spark plug, which is being produced in the new plant at Fostoria, Ohio.

Thus the parent company in Toledo combined with its various subsidiary divisions provides complete and unified engineering and manufacturing facilities for the ignition requirements of every branch of the automotive industry. This organization of automotive electrical and mechanical equipment manufacturers is an outstanding example of its kind and the general set-up should be of greatest interest to the industry because of the unique management control which has not only coordinated the manufacturing facilities of the group but has set up, in addition, a central engineering and research department serving all members of the co-operative group.

In recent months, the company has expended many hundreds of thousands of dollars to modernize the manufacturing plants. Much of this is represented in the new spark plug plant at Fortoria; a goodly portion has been invested in the development of new assembly lines designed to facilitate production, and the purchase of new machinery for the Toledo plant. The latter includes some New-Britain Gridley automatics, two special Electric Furnace Co. heat treating machines, a battery of presses for the horn department, and a large number of miscellaneous machines including an addition to the battery of welders used for welding motor and generator frames.

To give our readers a comprehensive picture of what the Auto-Lite organization means we have included some tabular material which emphasizes the amazing variety of activity encompassed by the group as a whole. The principal table lists all of the divisions of the company and is supported by another list giving the principal products of each unit. Another important table gives the complete factory management personnel for each division. Thus you can visualize quite readily the implication of the corporation's activities and get acquainted with the key men at Toledo and subsidiary plants.

Complete armatures now are balanced on this new dynamic balancing machine made by the Globe Tool & Engineering Co. of Dayton. Dial gages indicate amount and location of unbalance

Perhaps the outstanding feature of the divisional set-up, so far as the motor car manufacturers are concerned, is the availability of a second source of supply within a single organization. This has been consciously worked out so as to safeguard the car builder's interests concommitant with the usual hazards of manufacturing. The most important example of this is the duplication of facilities for the manufacture of the principal units at Toledo, Syracuse, and at the Canadian plant at Sarnia. Another fine example is found in the scattering of battery manufacturing plants producing Prest-O-Lite and U.S.L. batteries.

Careful study of the list of subsidiary companies shows unmistakably that the parent company has made a wise selection of plant locations for its subsidiaries, assuring uninterrupted service to its customers. Herein is a

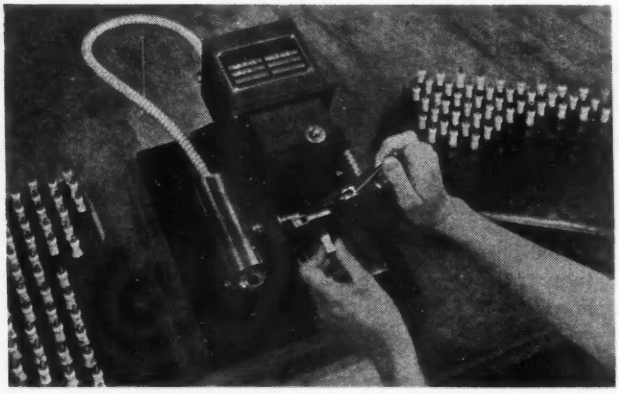
practical development of the new theory of management which seeks to prevent the concentration of manufacturing facilities in one plant or in one locality.

About a year ago, Auto-Lite completed the organization of its centralized engineering division at Toledo designed to serve the commercial and fundamental research needs of all subsidiary companies. The details of this set-up were published in *Automotive Industries*, November 9, 1935. At Auto-Lite there is a very close relationship between engineering and manufacturing functions as will be evident from a study of the set-up. The engineering division is divided into sections in charge of senior engineers responsible for research, design, and detail preparation for production of products assigned to their section. They are also responsible for the supervision of products in production in cooperation with Plant Products Engineers located in each manufacturing unit.

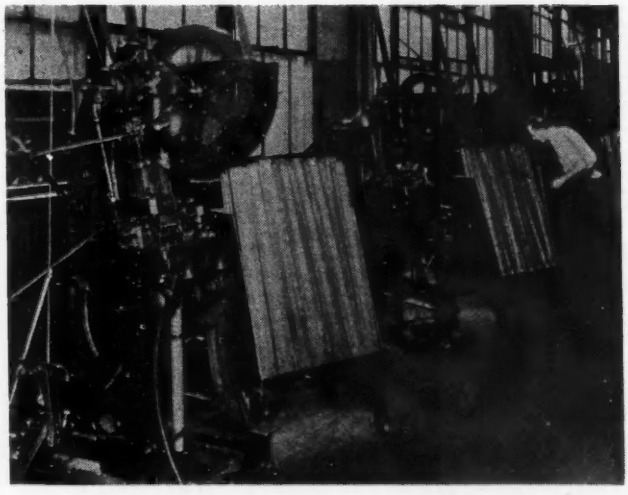
In addition to these functions, the engineering department is responsible for quality control and quality standards, this responsibility being extended to the design of inspection equipment used in production departments. Some of this equipment will be found in the pictorial section; a condensed description of a new device for checking horn tone quality will be found in the body of this article.

Through the whole-hearted cooperation of the Auto-Lite management we are permitted to present in this article a complete perspective of the overall activity of this great group of electrical equipment manufacturers. While the body of the discussion is centered about the Toledo plant and its doings, we shall also cover the spark plug plant in some detail. The work of subsidiary companies will be presented as a part of the whole picture by showing

Battery of Cincinnati centerless grinders used on one of the armature shaft diameters. Other machines of this type including a new model recently installed, will be found in several other departments.



Spark-plug gap setting is controlled precisely by means of this fixture, using a photocell to check the gap. The equipment is made by the Electronic Control Corp.



Part of the battery of Toledo presses in the new horn department, used for punching laminations for horn armature.

Factory Routing for Drive End Head

Operation Name	Type Machines
Chuck OD. R&F face frame seat R&F turn frame pilot face two ⅝ dia. core drill, bore and ream brg. hole	New Britain lathe
Finish face pulley side	Baker Horiz.
Finish face pulley side	New Britain
F. face brg. hub to .473 dim.	Leland-Gifford drill
Drill 8 holes	Multi. drill
Tap 2 holes	
Drill, ream and chamfer oil hole	No. 3 S. Leland-Gifford drill press
Tap 5/16 x 18 hole	Garvin tapper
Shear oil groove	No. 1 Toledo press

representative views in many of the plants, in the pictorial section.

Toledo activities are high-spotted by interesting views in the pictorial section and supplemented by a number of detailed factory routings on certain typical parts.

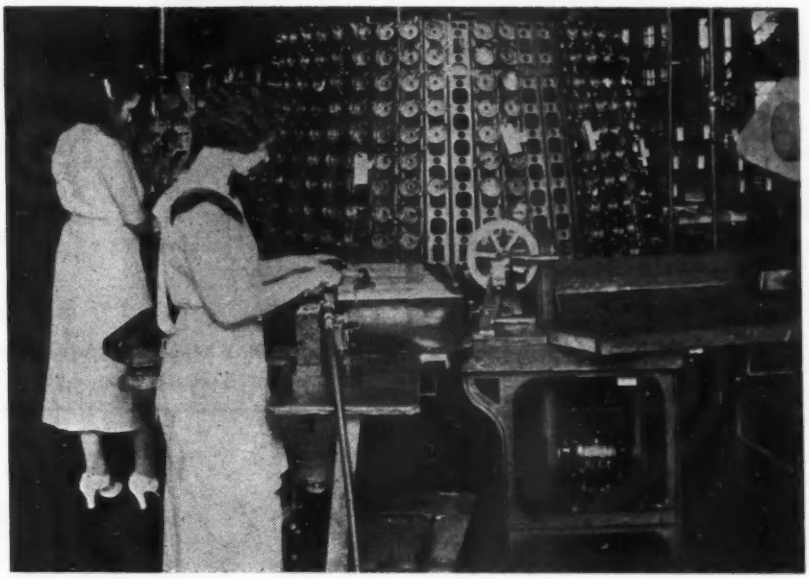
Toledo Plant

Due to the variety of ignition units produced at the main plant in Toledo, the factory has been departmentalized skillfully so as to separate the large and small volume assemblies. Thus the large volume, interchangeable, units for big production cars, are machined and assembled in special departments equipped for mass production, while the smaller volume units, including the large assemblies for trucks and buses, are made in other departments designed for smaller volume. Although the large and small volume production departments are differentiated by fundamental differences in machinery and assembly line procedures, the quality standards and controls are identical.

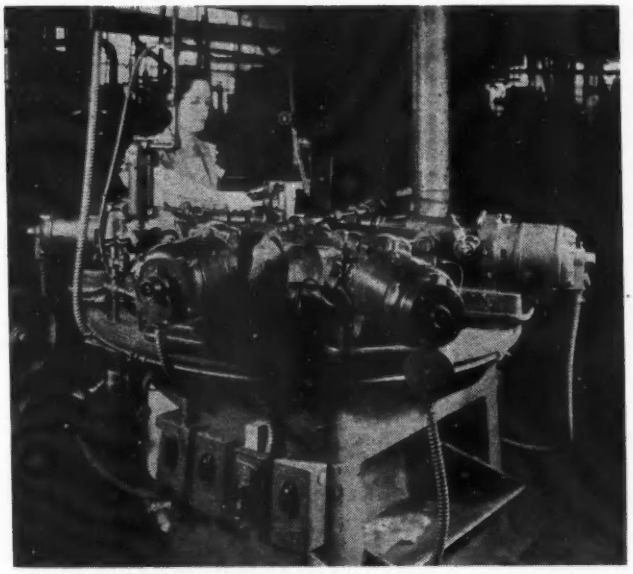
The following is a list of the principal production departments in the Toledo plant:

Department	*Description*
1	Frame and End Head Fabrication
2	Press Room
3	Plating-Cadmium, Chromium, Zinc, Copper
5	Automatics, Including Brown & Sharpe, Gridley, Cleveland, Etc.
6	Igniter Final Assembly
7	Clutch Assembly
9	Igniter Casting Machining
16	Generator Final Assembly
17	Horn Final Assembly
18	Heat Treat
105	Automatic Department
106	Primary Head Operations
109	Final Coil Assembly
111	Primary Armature Assembly
112	Armature Final Assembly
117	Final Motor and Generator Assembly

To acquaint our readers with the



Feature of ignition distributor line is the use of the vertical turntable transfer stands, one of which is shown here, to facilitate sub-assembly and final assembly operations. An inspection station incident to one of the operations at this point may be seen in the foreground.



Special multiple-head drilling machine used for drilling six holes in one setting.

General view of merry-go-round final assembly of headlamps at Corcoran-Brown. Lamp shells come in from the japan department on an overhead conveyor line and are set into assembly jigs by the operators. Small parts are added to the assembly as the shell passes the various assembly stations, each one being provided with the necessary parts. After assembly, the lamps are removed from the table by inspectors and checked for quality and lighting.

Engineering and Manufacturing Personnel Toledo

A. E. Buchenberg, director of engineering
L. H. Middleton, chief engineer
Byron A. Fay, plants manager
C. W. Pound, production manager
C. W. Francis, production engineer
C. F. Gilchrist, products engineer
J. D. Wilsey, chief inspector
C. W. Adams, in charge of planning
W. E. Whalen, construction engineer

Subsidiaries

Moto Meter Division
Toledo, Ohio

C. M. Adams, gen. mgr.
Thomas E. Smith, production mgr.

La Crosse, Wis.

John R. Padesky, in chge. of prod. and eng.
D. B. Stratton, plant mgr.

List of Automotive Products

Metal Decorative Lithographing
Etched Dials and Face Plates
Magnetic Speedometers
Electric Gasoline Gages
Hydrostatic Fuel Level Gages
Ammeters
Distance Type Heat Indicators—Automotive
Warn-O-Lite Signalling Devices
Radiator Type Moto Meters
Bourdon Tube Pressure Gages
Aircraft Thermometers
Aircraft Pressure Gages
Aircraft Flight Indicating Devices
Aircraft Warning Indicators
Exhaust Gas Analyzers
Industrial Pressure Gages
Industrial Vacuum Gages
Industrial Pressure Recording Instruments
Industrial Recording Thermometers
Tire Testers
Hub Caps
Radiator and Tank Caps
Bakelite Mold Products
Hydraulic Spotlight Switches
Panel and Headlight Switches
Automotive Dash Assemblies

Corcoran-Brown Lamp Co.
Cincinnati, Ohio

Gus P. Doll, president and gen. mgr.
C. L. Patterson, prod. mgr.

List of Automotive Products

Automobile Head, Tail, Cowl, Fender and Driving Lights
Market Lights
Meter Test Cabinets
Flashflectors
Aviation Lighting Equipment

Alemite Die Casting & Mfg. Co.
Woodstock, Ill.

Fred H. Drummond, gen. mgr.
John Giles, prod. mgr.

List of Automotive Products

Zinc and Aluminum Base Die Castings
Automotive Hardware and Ornaments
Drill Stands

Owen-Dyneto Corp.
Syracuse, N. Y.

G. J. Bundy, vice-pres. and gen. mgr.

List of Automotive Products

Starting Motors
Generators
Windshield Wipers (Electric)
Battery Charge Regulators
Heat Blower Motors
Electric Arc Welders
Welding Wire and Accessories
Cut Out Relays
Fan Blower Motors
Full Voltage Regulated Bus and Truck Generators
Magnetic Starting Switches

Prest-O-Lite Storage Battery Co., Inc.
Indianapolis, Ind.

Jos. H. McDuffee, pres. and gen. mgr.
James Green, plant supt.

List of Automotive Products

Automobile Storage Batteries
Bus and Truck Batteries
Lighting Plant Batteries
Aircraft Batteries

American Enameled Magnet Wire Co.
Port Huron, Mich.

J. A. Minch, pres.
J. P. Gerber, superintendent
W. P. Dunn, prod. mgr.

List of Automotive Products

Drawn Copper Wire
Enameled Magnet Wire
Automotive Ignition Cable
Radio Cable and Wire
Rubber Covered Wire
Commutator Segments
Coils: Primaries and Secondaries
Wiring Harness
Storage Battery Terminals
Battery Cable
Motor Lead Wire

Electric Auto-Lite Ltd.
Sarnia, Ont.

J. A. Minch, pres.
W. Eric Harris, resident mgr.
L. O. Bliss, superintendent
Electric Auto-Lite Co., Toledo, O

List of Automotive Products

Starting Motors
Drives: Magnetic, Mechanical and Bendix
Generators: Third Brush, Shunt, Air-Cooled and Continuous Duty —100 to 1000 watts
Distributors: Manual Automatic Vacuum and Selective Control
Circuit Breakers
Voltage Regulators: 2-Step, Vibration and Compensated
Starting Switches: Mechanical, Vacuum, Electrical
Horns: Vibrator, High Frequency, Electric, Air
Ignition Coils
Condensers
Resistors
Spark Plugs

The Columbus Auto Parts Co.
Columbus, Ohio

R. E. Klages, pres. and gen. mgr.
R. D. Klages, assistant gen. mgr.
E. C. Stein, plant superintendent

List of Automotive Products

Tie Rods, Drag Links
Machined Upset Forgings
Service Parts
Display Racks

Foundry Division,
Fostoria, Ohio

W. W. Sherman, gen. mgr.
W. W. Smith, plant supt.
C. Turner, chief inspector

List of Automotive Products

Production Grey Iron Castings
Auto Exhaust Type Heaters for Ford, Chevrolet, Dodge and Plymouth

procedure in some of the manufacturing departments, we have given details of the following routings—pinion housing, frame assembly, armature shaft, distributor base, armature complete assembly, and the drive end head.

The visitor to this plant will see much of the equipment familiar to Detroit factory men. Here for example is a battery of the towering Bullard Mult-Au-Matics which are used for machining starting motor pinion housings. These machines are fundamental to certain types of automotive metal-cutting operations and are common to most motor plants. At the Toledo plant, the Bullards are used to rough and finish the mounting flange, rough and finish turn and chamfer pilot, core drill—bore—ream—chamfer bearing hole and face end of bearing. These operations are performed automatically.

In support of home industry, Auto-Lite uses a great number of Toledo presses of different sizes. However, the other familiar makes also are represented on certain jobs, among these being Bliss, Ferracute, and Flexible.

Centerless grinding of shafts as well as cylindrical elements of various castings is common practice here. For example on the distributor base, the shank is ground on a Cincinnati centerless. And one of the diameters of armature shafts is ground within precise limits on the same type of machine.

One of the most interesting operations in the plant, and incidentally one which created much attention when it was first developed, is the production of the motor and generator frame assembly. The key to this operation is a group of automatic arc-welding machines with the electronic tornado principle. As illustrated, the formed frames are fed down to the welding head by gravity magazine feed and the gap between the ends filled in automatically with the shielded arc. Several new machines have been added to the battery recently to handle current production.

Many of small gray iron fittings have been machined, in the past, on hand-operated Gridley machines. Today, large New Britain Gridley automatic screw machines are being installed for this purpose and will eventually replace most of the hand machines.

The heat treating department recently installed two new Electric Furnace machines. The first of these is a continuous, controlled atmosphere, rotary hearth, pan-dumping furnace for clean hardening of miscellaneous small and medium sized parts such as cams, diaphragms, etc. The furnace handles 250 pounds of metal per hour and has one automatically controlled heating zone. Work is loaded onto trays on the circular hearth, is carried through the heating cycle, and is then dumped through a chute to either water or oil quench tanks. Automatic temperature control is effected by the Leeds & Northrup Micromax controller.

The second machine is a controlled atmosphere, copper-brazing furnace of the continuous conveyor type. It is used for copper-brazing the assembly of generator pulleys, cam assemblies, etc. Parts to be brazed are loaded on the moving wire mesh belt and are carried through the heating and cooling chambers which are provided with a protective gas atmosphere. The con-

American Leather Products Co.
Indianapolis, Ind.

Jos. H. McDuffee, pres.
R. H. Scott, vice-pres. and gen. mgr.
James Green, plant supt.

List of Automotive Products
Automotive Protective Boots, etc.

Concealed Door Check Co.
Indianapolis, Ind.

Jos. H. McDuffee, pres.
H. G. Simmons, plant supt.

List of Automotive Products
Metal and Fabric Rubber Covered Auto Door Checks
Small Metal Stampings
Battery Display Stands

U.S.L. Battery Corp.
Oakland, Calif.

P. F. Brown, mgr.
J. G. Monnin, plant supt.

List of Automotive Products
Starter Batteries for Automotive Application

Prest-O-Lite Storage Battery Co., Ltd.
Toronto, Canada

R. H. Coombs, gen. mgr.
A. Merchant, plant superintendent

List of Automotive Products
Storage Batteries

South West Battery Corp.
Oklahoma City, Okla.

E. E. Swain, plant supt.

List of Automotive Products
Storage Batteries for Automotive Application

U.S.L. Battery Corp.
Niagara Falls, N. Y.

R. T. Pierson, vice-pres. and gen. mgr.

List of Automotive Products
Storage Batteries

U.S.L. Battery Limited,
Toronto, Canada

W. Taylor, plant mgr.

List of Automotive Products
Storage Batteries

Buck-Eye Bumpers
Springfield, Ohio

C. M. Adams, president
B. F. Fortier, vice-pres. and gen. mgr.
Paul Lohnes, prod. mgr.
F. W. Leader, chief inspector

List of Automotive Products
Automobile Bumpers

Earhart Door Check Co.
535 W. Jefferson Ave., Detroit, Mich.

List of Automotive Products
Steel and Rubber Auto Door Check Straps

Spark Plug Plant
Fostoria, Ohio

Byron A. Fay, plant mgr.
D. R. Churchman, prod. mgr.

List of Automotive Products
Spark Plugs

Barley Industries, Inc.
535 W. Jefferson Ave., Detroit, Mich.

List of Automotive Products
Automobile Antisqueak Padding
Automobile Rubber Padding Shims
Automobile Hood Lacings

Sterling Cable Corp.
Port Huron, Mich.

List of Automotive Products
Replacement Automotive Cables
Ignition Cable Sets
Battery Cable
Spool Cable
Terminals

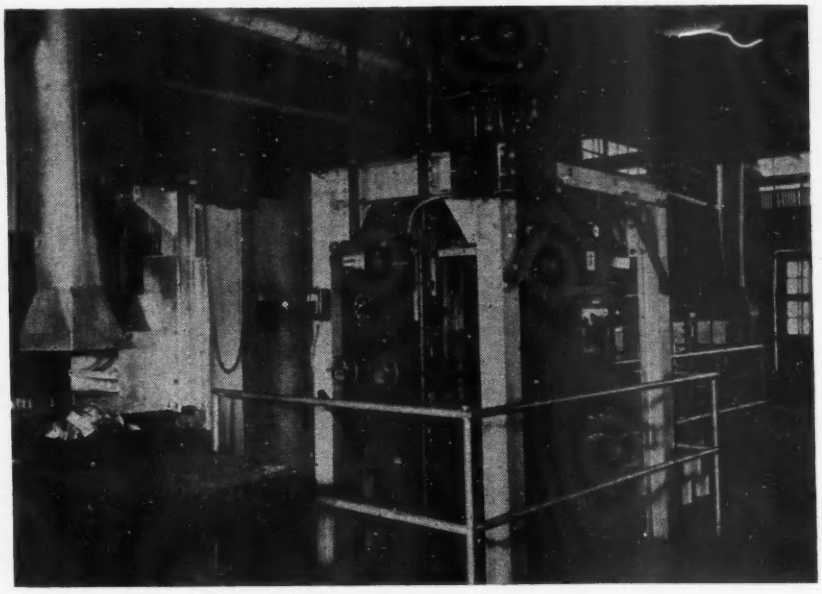
veyor discharges the parts at the other end of the furnace, securely brazed, clean and bright.

A new type of equipment is represented by the rotary table feed drilling machine made by the Bodine Corp. of Bridgeport, Connecticut, which is used in the new horn department for horn arm drilling. A number of these machines are in use in other parts of the plant.

The constant course of progress in ignition manufacture may be gauged by one of the smaller pieces of equipment recently installed here. This is a Globe dynamic balancer for armature shaft assemblies. It makes possible the determination of the amount and location of unbalance during rotation, thus permitting the production of precisely balanced armatures. This, naturally, results in machines free from vibration at any speed.

Quality control is evident in every step of the process in manufacturing departments. Some of the unique inspection devices will be found in the pictorial section but we shall take time here to give some of the details of the special horn testing equipment which was developed by Auto-Lite engineers. Quoting from a report by L. H. Middleton, chief engineer:

"The Auto-Lite horn matching device operates on a stroboscopic principle. The matching device consists of a Neon tube and transformer, a synchronous motor, a gear reducer of the ratio required to obtain the desired frequency limits, and a stroboscope disc.



New Electric Furnace Co. continuous copper-brazing furnace used for brazing pulleys and other assemblies in a controlled atmosphere which produces clean, bright parts.

"When in operation, the disc rotates but being inclosed in a darkened case, its card is not visible until the tube is illuminated. The disc has concentric rings with varying numbers of dots. Those dots exactly in phase will apparently stand still, for the tube is in effect connected across the horn terminals and is illuminated exactly in phase with the horn frequency. Actually the inductive E.M.F. across the horn terminals is transformed in a higher ratio and this energy is used to illuminate a stroboscope tube.

"Assume that the chord required is to be a fourth (ratio ¾) and the basic pitches are 300/400, also that a tolerance of plus or minus six cycles is permissible on the lower pitch.

"Using an 1800 R.P.M. synchronous motor and a 10:1 gear reducer, we will turn the stroboscope disc at 180 R.P.M. or 3 R.P.S. Then 300/3 = 100 or the number of equally spaced dots required to indicate a frequency of 300 cycles. It follows that by adding additional concentric circles of 98, 99, 101, and 102 dots, the frequencies 294, 297, 300, 303 and 306 can be read directly,

View of recently-installed New Britain - Gridley automatic chucking machine which will be used for machining miscellaneous cast iron fittings and parts.

Factory Routing for Frame Assembly

Operation Name	Type Machines
Cut-off and pierce panel holes	75½ Bliss press
Form	77 Bliss press
Iron	Punch press
Weld	Lincoln welder
Bore	Baker mills
Face ends and chamfer	
Pierce term. hole	P-2 Ferracute press
Drill 4 holes and c'sink term. hole	Spec. drill press
Drill 2 pole piece holes and burr inside 2 pole piece holes	Spec. 25 Kingsbury Duplex
Drill 2 dowel holes	No. 3 Leland-Gifford drill press
C'sink pole piece holes	S.S. drill press
Chamfer 2 dowel holes	Spec. Kingsbury
Tap 4 holes	SS HS drill press
Drill name plate hole	Rotary file
Remove burrs inside 6 holes	Washer
Wash	Sand. Mach.
Sand O.D.	Bench
File Panels	Wash Mch.
Wash	

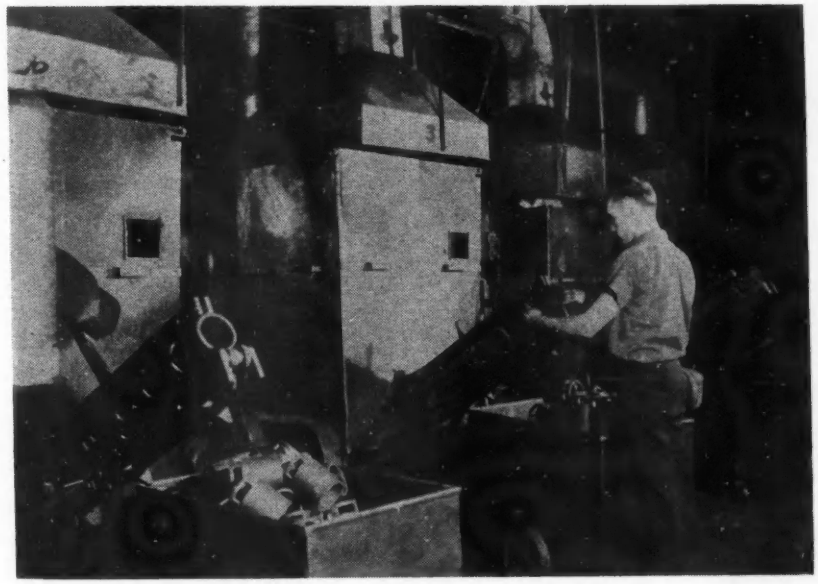
and that by reading between the rings, frequencies of 295.5, 298.5, 301.5 and 304.5 can be obtained. In fact, the frequency requirements are made within bands of 1½ cycles.

"To meet the high pitch requirements a 7.5:1 gear ratio is used and all other parts are identical. This set-up will make possible the separation of high pitch horns in bands of two cycles width and when matched arbitrarily with low-pitch horns, as already described, they will deviate less than one cycle from the true chord. One experienced operator can check and identify over 2000 horns in eight hours without guess-work and at the one point where matching should be made, that is, the end of the line."

Finally, the visitor will be greatly impressed by the new assembly department recently placed in operation for the production of motor and generator assemblies. This is a completely mechanized assembly line with overhead feeder line conveyors delivering parts from other stations and endless table belts for assembly work-places. Several good views of this department will be found in the pictorial section. Inspectors keep a watchful eye on every phase of the operation utilizing various types of equipment for this purpose, including electrical tests for windings and mechanical tests for torque capacity.

The igniter department has many interesting items of equipment for assembly and inspection, some of which

Bullard Mult-Au-Matics tower in this section of the plant. They are used for finishing pinion housings for starting motors.



Large battery of automatic shielded arc-welding machines is used in department on basement floor for welding seam in motor and generator frames. Formed cylinders are fed into the welding heads by means of the gravity magazine.

Cleveland and Gridley automatics used for machining miscellaneous cast iron parts and fittings.

General view of kiln for vitrifying ceramic bodies.

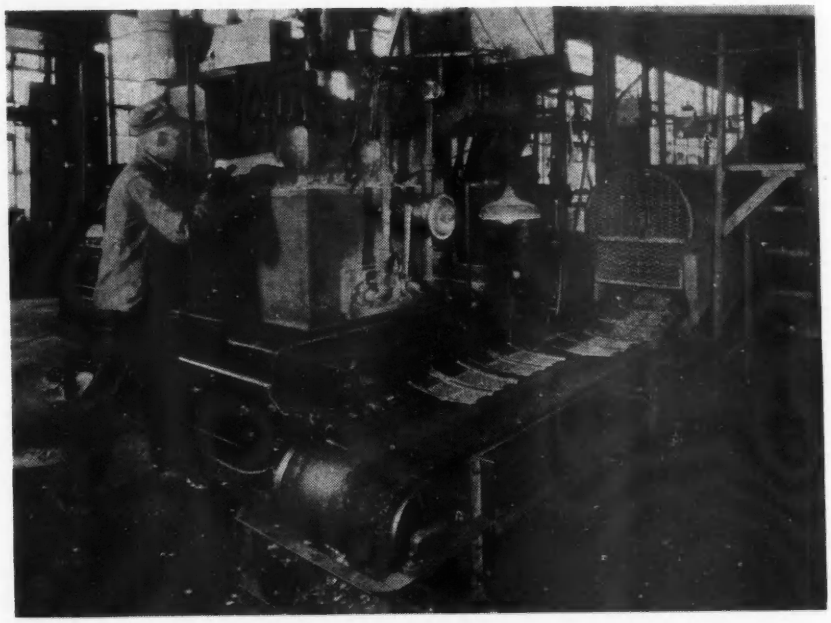
are shown in the pictorial section. Depending upon the design of the unit, it is checked for synchronization of breaker arms, for governor action in accelerating and decelerating, vacuum control, etc.

The new spark plug plant at Fostoria has been completely equipped for the manufacture of the new Auto-Lite plug. It contains ceramic equipment for the production of Ziramic insulators as well as metal working machinery for fabricating the metallic elements such as the body and electrodes.

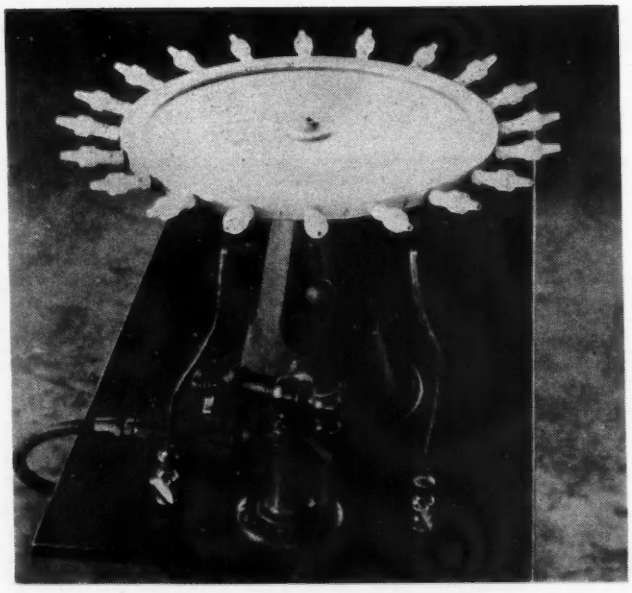
In the pictorial section you will find illustrations showing the kiln for vitrifying the ceramic body, the machine for glazing the body, and a number of special inspection devices. Among the latter are: a test fixture for determining thermal shock resistance of the ceramic body, and a special machine equipped with a photocell for automatically controlling electrode gap.

Subsidiary Companies

As mentioned earlier, the subsidiary companies are represented in this over-



Automatic grid casting machine producing 222 battery grids per minute—almost enough for six passenger car batteries. This view was taken at the Prest-O-Lite battery plant in Indianapolis.



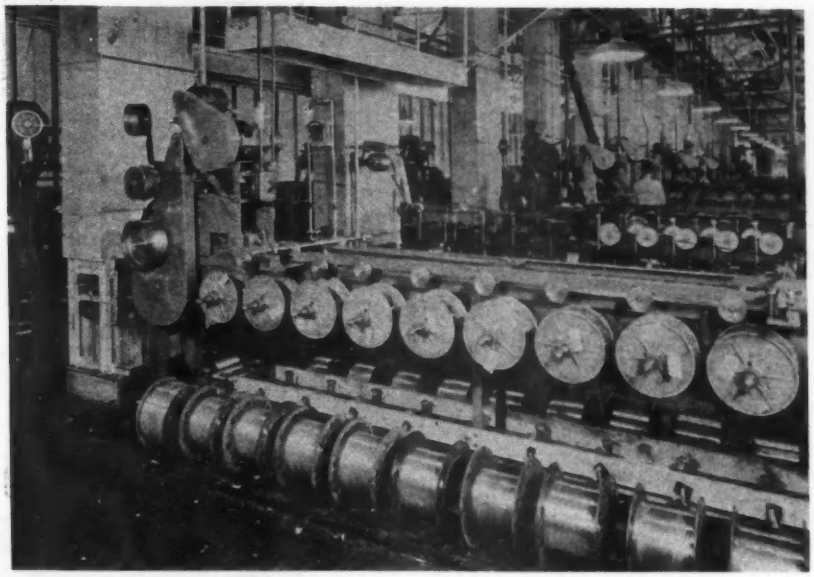
Spark-plug test fixture for determining thermal shock resistance of ceramic body.

Factory Routing for Pinion Housing

Operation Name	Type Machines
R&F face customers mounting flange. R&F turn and chamfer pilot, core drill, bore, ream and chamfer brg. hole and face end of brg.	Bullard Mult-Au-Matic
R&F face flange seat and ⅛" dim. of pilot. R. turn frame pilot and face brg. boss and F. turn frame pilot.	Cleve. automatic and No. 4 B&O
Press in and Size Brg.	P-2 Ferracute Press
Drill two ¼ x 20 tap holes, one No. 29 hole, two 31/64 holes and one .3745 ream hole.	Duplex
Tap 2 holes	2 S. Leland-Gifford Dr. Pr.
Ream and spot face .3745 hole	Avery SS drill
Mill flat	U.S. Hand Mill
Finish turn customers pilot	
Paint and hang on conveyor	
Burnish brg. hole in pinion hsg.	

all picture chiefly by striking views taken in some of the plants. Among these, the Alemite Die Casting & Mfg. Co., Woodstock, Ill., is a plant occupying 162,000 square feet of floor space devoted to the production of die castings of every size and description for the automotive industry, including hardware of every type. Castings are produced of zinc alloys, tin, lead, and aluminum; also many special alloys which may be specified by the user.

This plant has complete facilities for making dies and molds, machining, polishing and plating. The casting department is equipped with a huge battery of semi-automatic die casting machines and is believed to be one of the most modern as well as one of the largest die casting establishments in the country.



Battery of enamel wire ovens at American Enameled Magnet Wire plant. This is a precise operation since the enameled coating must have perfect electric insulation after baking and yet retain sufficient flexibility to take sharp bends without cracking. On 30 ga. wire, for example, the allowable variation in enamel thickness is held to 0.0005 in.

Spark-plug test fixture for determining electrical insulating properties of ceramic body.

(c) Special Pressure Casting equipment for manufacture of non-corrosive "Nokrode" Battery Cables.

(d) Battery cable stranding and covering machine of own design. Produce—8 miles of battery cable per day.

(e) New stock and shipping room (occupied March 15th). Over 10,000 ft. of stock and shipping facilities, complete with rail siding and truck loading pits.

At Port Huron the Auto-Lite division is now breaking ground for further expansion of production facilities which will increase output by

Canadian Auto-Lite plant has large armature shaft and automatic department shown here. One of the Cincinnati centerless grinders for the armature shafts is seen at the left in the foreground.

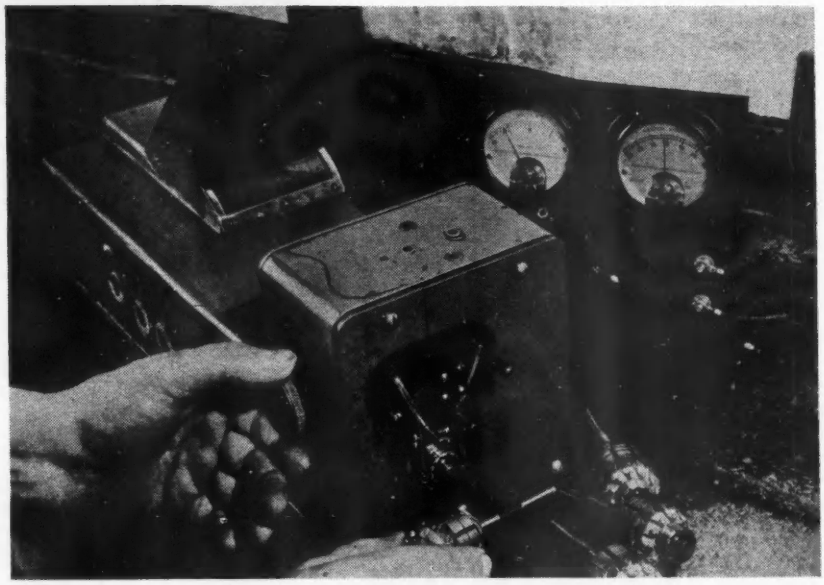
The cable plant of the American Enameled Magnet Wire Co., Port Huron, Mich., occupies 200,000 sq. ft. of factory space and represents an added investment of $300,000 in new equipment, in 1935. Included in this expenditure was the following equipment:

(a) Latest Banbury mixing equipment for Rubber Compounds. This machine reduces the time of mixing Rubber Compound to 1/10 the time formerly required. Full automatic control.

(b) Conveyor system delivering the raw material to the mixer and conveyor for cooling the finished mix. Capacity 12 tons per day.

View in tool and die shop of Alemite Die Casting & Mfg. Co., showing some dies in the course of construction.

Special dynamic balance testing machines of the oscillograph type are used for balancing armatures at Owen-Dyneto. The armature does the driving and consequently its electrical characteristics are checked on the meters shown in the background while b a l a n c e is being tested. Degree of unbalance is indicated on the hooded scale at the left, a straight line of light denoting perfect balance. Insulated lead weights are added to the armature at the proper places to achieve perfect balance.

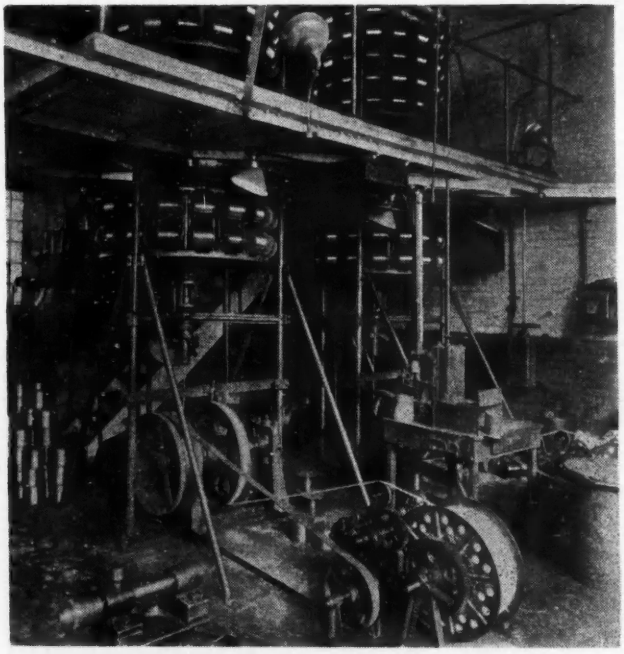


50 to 75 per cent. Details of this program are as follows:

New Building totalling 30,000 sq. ft. floor space for Drawing Room, Stranding, Battery Cable, Enameling, Braiding and Machine Shop. Additional tubing equipment in Rubber department. Additional cotton serving and paper serving machines.

New High Speed Stranding Equipment. Additional Wire Drawing Machines. New Enamel Ovens—both fine and intermediate sizes. New Braiding Equipment.

The foundry division at Fostoria is equipped with modern production machinery for blowing cores, core drying, molding, etc., and features a modern laboratory where all sand and raw materials are tested. In addition, the lab-



Group of battery cable stranding machines at the American Enameled Magnet Wire Co. The cables are made up of 127 strands of fine copper wire, twisted together and covered with a paper wrap.

Factory Routing for Armature Shaft

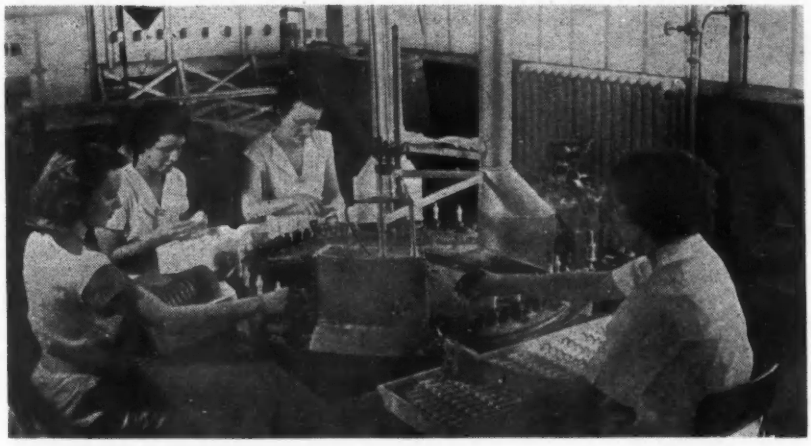
Operation Name	Type Machines
Chamfer and under cut DE. turn CE.	1¼ Gridley Automatic
Grind .573 dia. and burr cutoff end of shaft	No. 2 Cin. centerless hand mill
R & F grind to .673 diam.—2 cuts	Cin. centerless grinder
Center ends (one end at a time)	Screw mch.
Wash centers in kerosene	Bench
Knurl lam. seat	No. 60 Waterbury
Grind lam. knurl (in feed method)	No. 2 Cin. centerless
Knurl Comm. seat	
Rough grind comm. end brgs.	No. 11 B. & S. grinder
Form oil thrower and radius end of comm. brg.	No. 2 B. & O. press
Mill keyway	Hand mill
Finish grind CE bearing	No. 11 B. & S. grinder
Finish grind DE (Step Wheel)	No. 11 B. & S. grinder
Thread DE	No. 3 B. & O.
Wash	Wash Mch.

oratory technicians provide an hourly metallurgical and chemical check on the iron used for pouring.

The foundry comprises several units for continuous squeezer work; one unit capable of handling 175 to 300 molds from each pattern each day, and another unit of similar capacity. There is a separate unit for heavy castings such as transmissions and flywheel housing and two manifold bays with a capacity of about 3000 pieces per day. Another large bay in the foundry is devoted to short order and squeezer work. It is of interest to note that the pouring and production bays are arranged in a geometric pattern with each one occupying a space of about 240 x 40 feet.

Since space does not permit a complete analysis of each of the subsidiary companies, we have selected the foregoing as examples of the facilities to indicate the modernity of the entire set-up as well as to note the technical progress that is being made continually.

One of the huge semi-automatic die casting machines at Alemite Die Casting plant. View shows operator removing a medium-sized zinc alloy casting from machine.



This turntable machine is fitted with an automatic head, at the right, for spraying the glaze on the ceramic body.

Conclusion

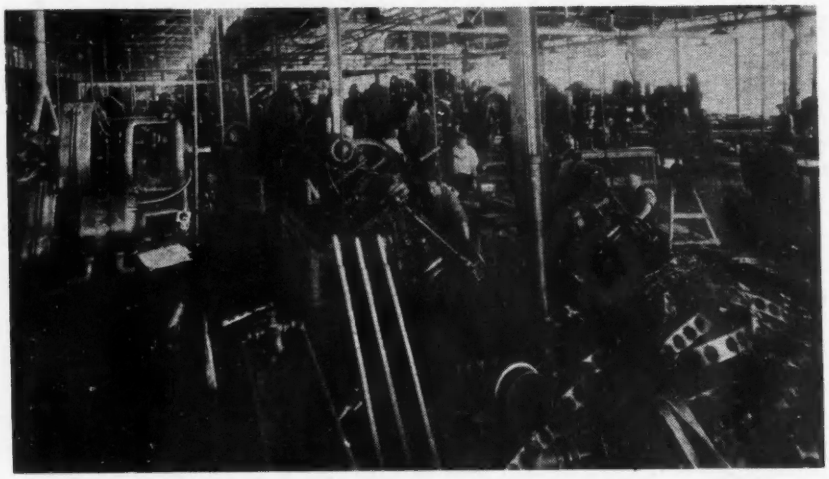
This brief high-spotting of one of the largest parts manufacturers in the automotive industry is intended to give the reader some perspective of this gigantic organization with its widespread activity blanketing the entire field of automotive electrical equipment.

While the discussion has been necessarily brief and greatly compressed, we believe that the pictorial section as well as the more detailed treatment of the Toledo plant will serve to lay the ground work for a better understanding of the Auto-Lite philosophy of manufacturing and of its unmatched facilities for service to the industry.

We feel that the outstanding features of the entire set-up may be summed up as follows:

1. Importance of the widespread location of manufacturing plants offering the vital feature of a second source of supply for ignition units within the same organization.

General view of the long assembly tables at Niagara Falls USL plant. This line has a capacity of 10,000 batteries per day.



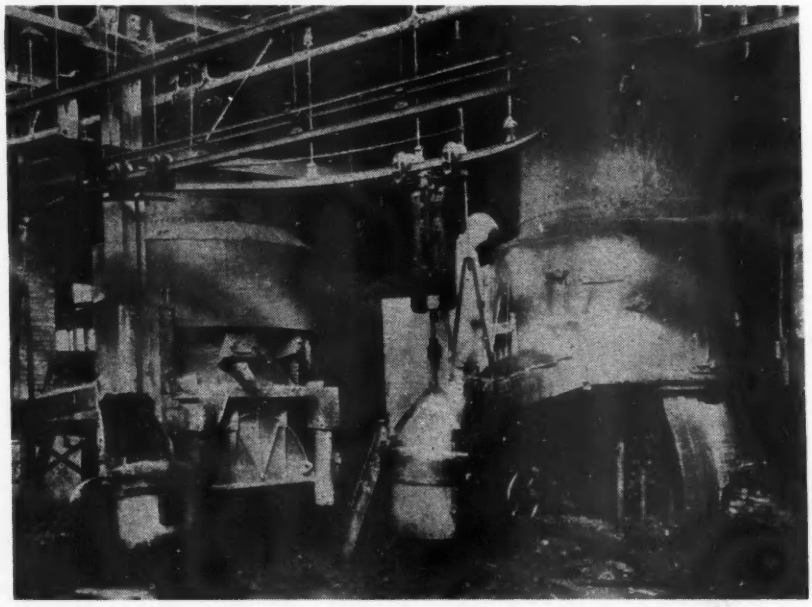
Punch press department at Auto-Lite plant in Sarnia, Ontario. Group of inclinable Toledo presses in foreground punching out armature laminations.

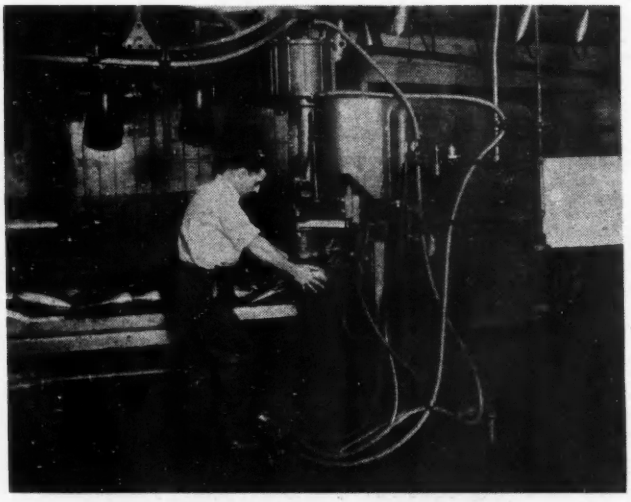
Two No. 9 Whiting cupolas of 200-ton capacity are in use at the Electric Auto-Lite foundry division at Fostoria, Ohio. They are connected with gates in pipe lines as protection against breakdown.

2. Importance of the centralized engineering and research division serving all units of the corporation and spreading the same ideals of advanced design and quality control throughout, thus achieving a truly balanced and matched performance of the electrical system.

3. Enlightened and comprehensive management control which has set up an ideal of modernization of production facilities, making it possible to keep the quality and cost of the ignition system well abreast of the fast pace set by car producers.

4. A set-up which embraces every element required for the electrical system of automotive equipment, enabling the motor car or truck manufacturer to standardize upon one source of supply, if he so desires.





Mounting brackets for Corcoran-Brown headlamps are welded to lamp body by specially-designed Thomson-Gibb extrusion welder. Instead of the usual riveting operation, the brackets are welded through ten extruded points. Productivity on this operation is 400 lamps per hour.

Factory Routing for Distributor Base

Operation Name	Type Machines
Center, face, neck and turn shank	New Britain-Gridley Automatic
Center face, neck and turn and groove shank	4½ Cleveland Automatic
Center face hub drill, ream, turn O.D. and bore ream bearing hole and c'sink	664 New Britain 2 sp. drill press
Turn face, chamfer and recess shank	4½ Cleveland Automatic
Turn O.D. bore	Cleveland Automatic
Chamfer both ends of shank	2 sp. drill press
Ream bearing hole	
Face shank to length	
Pres in and size bushing	Drill press
Turn OD of bell and shank	Arbor press Carbo lathe or LeBlond lathe
Grind O.D. of bell	No. 11 B & S grinder
Mill cap slot and indicate shank	Hand mill
Drill (2) 15/64 holes. two ⅛ holes and drill two .1135-.1165 holes	Kingsbury drill
Pierce bracket slots	PA No. 2 Ferracute press
Finish bore 2.874 dia.	No. 3 Allen drill
Grind shank	Cincinnati centerless grinder
Drill, c'drill and tap oil hole	No. 3 S. drill press
Drill ⅛" hole in shank and 5/32 hole drain hole in bell	Drill press
Mill .500 slot	

The Horizons of Business

By Joseph Stagg Lawrence

France Makes It Unanimous

IT happened. Like Harry Lauder's last appearances, French devaluation finally took place. Since the business line took its first downward plunge the possible devaluation of the franc has headed crisis after crisis not alone in France but on all the security exchanges in the world. In the American market it has been a hard working catalyst to crystallize current apprehensions. It has served repeatedly as a plausible reason for a turn in the stock market. Oddly enough when the decision to reduce the gold content of the franc by 25 to 34 per cent was taken the American stock market instead of taking a nose dive turned upward.

The causes, the fears and the authentic consequences of this action are reasonably clear.

The Rout of Virtue

The capitulation of France seems like the final rout of monetary virtue. The disastrous inflations of post-war Europe were largely the result of absolute necessity. Distracted finance ministers confronted with summary bills, unable to raise adequate revenue or to borrow had but one recourse, namely, the expansion of the currency. A careful study of these experiences proved that no one, in the long run benefited, that it was virtually impossible for any individual or group to hedge against them, that once started no stopping place could be found.

There was also a moral aspect and the element of interest. A reduction in the gold value of a currency constituted partial repudiation of every debt. Only the most exigent circumstances could justify such an injury to creditors, an injury against which they had no recourse. In the three countries which have just yielded to devaluation property is widely diffused, thrift is revered and an injury to property something which no finance minister could countenance with political safety. France, Holland and Switzerland have substantial middle classes with whom property and prestige are synonymous. There is little patience with or sympathy for those who cannot save some margin from their income for the rainy day, old age or the next generation. Any action which jeopardizes these hard won patrimonies is distinctly unpopular.

Yet in spite of the general recognition that a cut in the gold content of the currency is an inflationary step and that inflation undermines bank accounts, insurance policies and government bonds these three countries have finally come to the reluctant conclusion that it is the only thing to do so.

Compelling Reasons

Why the persistence of depression? We know from our own experience how difficult it is to resist pressure at a time when the country is suffering economic distress even though that distress is universal. The decline in business signalized in this country by the crash in the stock market was world wide. Its bottom was touched generally during midsummer 1932. In every country statesmen were assailed by groups and individuals each of whom had "a plan." Many of these plans such as pump priming, public works, doing something for silver, social credit, the bonus, the elimination of interest on the government debt, the deliberate expansion of that debt, the purchase of bonds and the reduction of interest rates by the Federal Reserve banks and the cut in the gold content of the dollar were inflationary in character. No one of these proposals could be pursued indefinitely without forcing the country sooner or later to abandon gold. A combination of these, reflected objectively in the government deficit, made the departure from gold necessary.

Gold Bloc Lags

It is significant that the bulk of the world turned the corner in the summer of 1932 and that every country that participated in this turn had in some form and to a greater or lesser degree repudiated gold. From that point on production increased, commodity prices rose and stock markets mounted. The countries that remained aloof, cherishing their fidelity to the yellow standard, stood still—stood still near the bottom while the rest of the world moved on. However much they prided themselves on keeping faith with their bondholders, this growing gap and the failure to participate in world recovery was something which statesmen could not resist indefinitely nor would public opinion require them to resist it indefinitely.

Taking the average of France and Holland, industrial production in the four-year period from the middle of 1932 to the middle of 1936 rose 9 per cent, wholesale commodity prices declined 7 per cent and stock prices declined 0.8 per cent. World industrial production in the same period rose 67.5 per cent, wholesale commodity prices (England, U. S. and Canada) 15 per cent and stock prices 150 per cent. The evidence seems as overwhelming as the action predicted upon it is inevitable.

Excessive Fears

The recurrent apprehensions which this action provoked were never profoundly reasoned. There was concern lest foreign capital should leave this country and thus precipitate liquidation in our security markets. There was fear that the French and their currency dependents would acquire an exchange advantage which would enable them to compete more vigorously in international trade to our own injury. There was fear that the French action would provoke a world wide foreign-exchange war, a sort of competitive depreciation of currencies.

It is quite clear from Morgenthau's action and that of London that the two countries most capable of starting a depreciation race have not the slightest intention of doing so. On the contrary they not only welcome the French action as the prelude to possible international stabilization but will even use their own resources to maintain stability of the exchanges. The French, the Dutch and the Swiss in the aggregate

(Turn to page 463, please)

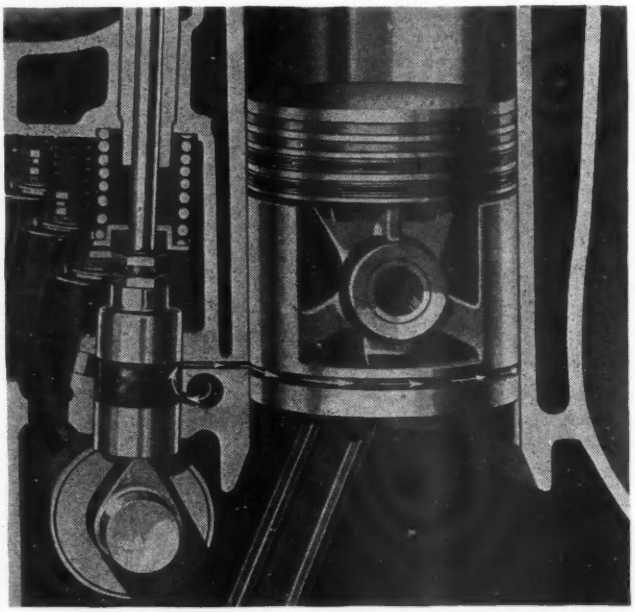
Fresh Styling Marks the

Three completely restyled six-cylinder lines, all in the low-priced class, are offered by Graham-Paige for the 1937 market. These are supplemented by the Crusader Six, Series 85, with a 111-in. wheelbase, which is continued unchanged. The Graham supercharger is now a feature of two models, instead of the highest-priced model only.

The complete line now comprises the Crusader Six; the Cavalier, Series 95, with a 116-in. wheelbase (up 1 in. over last year); the Graham Supercharger, Series 116, with 116-in. wheelbase, and the Graham Custom Supercharger, Series 120, with a 116-in. wheelbase chassis for coupe bodies and a new, supercharged 120-in. wheelbase chassis for sedan models.

Cavalier and Supercharger bodies are new, with a sharper V-type windshield having a wider opening for better vision. New body types for Series 95 and 116 include two-door and four-door models with and without trunk, a business coupe and a sport coupe with rumble seat. The same body styles, except the two-door, are offered on the Series 120.

The front-end appearance of the Graham has been changed materially by increasing the spacing of the horizontal bars in the radiator grille, by the introduction of a new medallion and radiator ornament, and by sweeping the center section of the radiator grille back along the top of the hood in a corrugated panel. This results in a wide fixed center panel at the top of the hood and two hinged hood sides. Louver treatment is new on all models, as are also the deep front fenders.



This illustration shows the piston lubrication system.

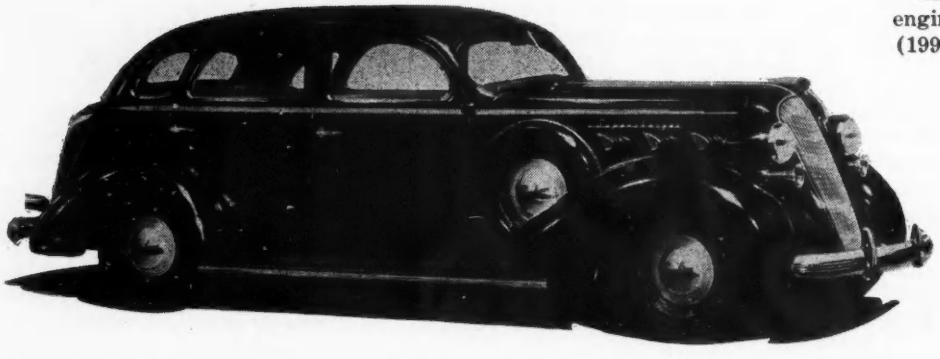
A defroster system is available as an extra wherever the heater is specified. On Grahams, the defroster consists of a special Tenite attachment mounted in the center of the instrument board and containing two orifices, one aimed at each windshield section. The jets are designed to direct a stream of heated air against the glass, and are claimed to clear both inside and outside surfaces at sub-zero temperatures in a few minutes. The heater is connected to the defroster valve by flexible tubing.

Interior treatment of trim and hardware is new and in keeping with the fresh styling. Door pull handles as well as the robe rail are made of heavy cordovan leather belting attached to hardware fastenings. Instrument board treatment is unique, employing a center "tower" section of Tenite with King-Seeley electrically-controlled instruments set in a vertical row, with edge-lighted illumination for the dials.

The former steel roof construction is continued. It features a steel insert top section insulated electrically from the body and serving as a very sensitive and effective radio antenna.

Engine Details

The Cavalier Six is 6-cylinder, L-head engine of 3¼-in. bore by 4-in. stroke (199 cu. in. displacement) which is



Custom Series 120 Supercharger 4 door sedan with trunk

Graham-Paige '37 Models

Three six-cylinder lines are offered in the low-priced field

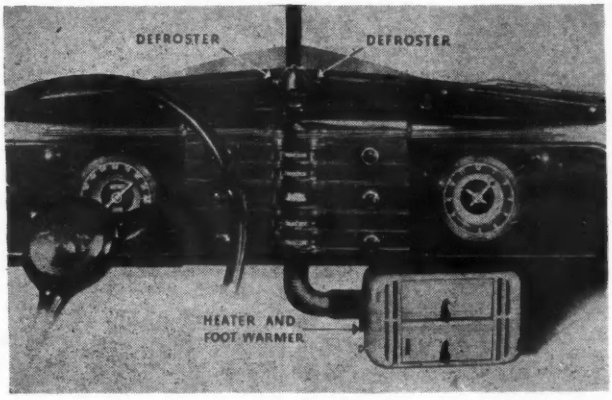
rated 85 hp. at 3300 r.p.m. It has an aluminum head and a compression ratio of 6.7 to 1. The same engine is used on the Supercharger Series 116 but with the supercharger the engine is rated 106 hp. at 4000 r.p.m., with the same compression ratio. The Custom Supercharger Series 120 is a 6-cylinder, L-head engine of 3¼-in. bore by 4⅜-in. stroke (217.8 cu. in. displacement). Its compression ratio is 6.7 to 1 with aluminum head, and it is rated 116 hp. at 4000 r.p.m. with supercharger. The Crusader Six is a 6-cylinder engine of 3-in. bore by 4-in. stroke (169.6 cu. in. displacement); it has a compression ratio of 6.8 to 1, with aluminum head, and is rated 70 hp. at 3500 r.p.m.

Important changes have been made in the lubricating system, pistons and connecting rods, and in the drive to the supercharger. The latter is now driven, for increased quietness, by an exposed double-belt drive using Manhattan-Raybestos belts. An automatic adjustment follows any increase in center distance to prevent belt slippage, and does not permit a decrease in center distance.

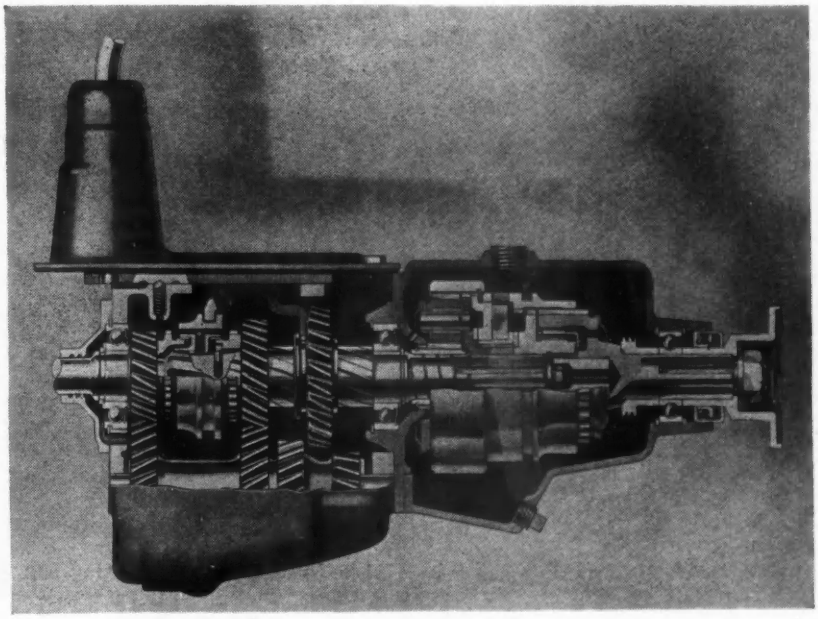
One feature of the new lubricating system is an improved crankcase ventilating system. The crankshaft by its rotation in the crankcase, serves as a rotary pump, drawing in fresh air through the oil filter and forcing it out through the vent pipe. The latter has a copper-wool filter at the top of the riser, and the riser slopes are so arranged that any oil foam or condensation reaching that point will run back into the crankcase.

In the two supercharged cars and in Series 95, radical changes have been made in the engine lubricating system. Connecting rod oil-hole drilling has been abandoned and oil grooves have been eliminated in the cadmium-silver connecting rod bearings. Cylinder wall lubrication is effected by a metered flow of oil through the cast, barrel-type valve lifters to an oil groove at the

(Turn to page 459, please)



Graham - Paige offers something new in their instrument panel



Graham Paige transmission with optional over-drive unit in separate casing

Weiss Joint Redesigned

Bendix adapts design to meet commercial production by the use of die cast parts

A NEW design of the Bendix-Weiss constant-velocity universal joint, better suited to production requirements, is now in production at the South Bend plant of the Bendix Products Corporation. It may be recalled that this joint consists of two yokes which form non-concentric intersecting ball races. Steel balls inserted in these races are caused, without any retainer or cage, to roll through one-half the angular distance traversed by the yoke. By thus maintaining the plane of driving engagement between the two yokes at half the shaft angle, the constant velocity feature is secured. This uniform velocity is in contrast to the four changes in speed per revolution with the conventional joint, and eliminates resulting load fluctuations. It is practical to use this type of joint where the angularity runs as high as 37 deg. (74 deg. included).

Assembly with housing cut away to show construction

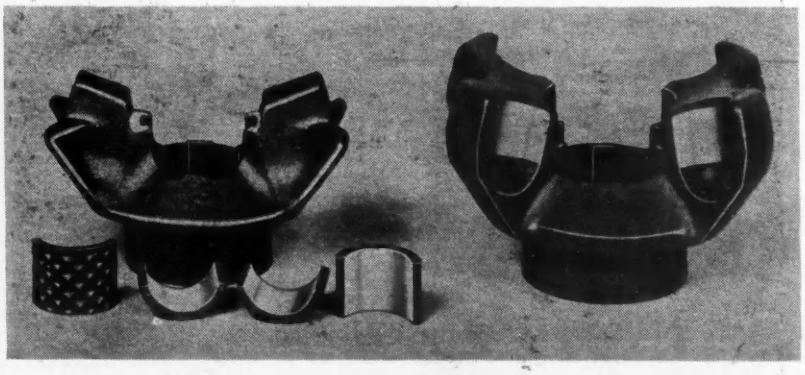
Another feature of this joint is rolling end motion obtained by allowing the balls to roll endwise in their races. The sliding of splines, necessary with a conventional joint, is eliminated, along with a source of wear and backlash, and the thrust on the bearings is reduced to a small fraction of that set up by the friction of spline sliding.

The coupling, or close-coupled assembly, consists essentially of two joints, and permits of much greater angularity, misalignment, and end travel than is obtainable with ordinary types.

In the past the joint yokes have invariably been made from steel and case hardened. The new die-cast method, used when production quantities warrant, very largely eliminates machining operations and produces accurate and uniform results. At first thought it might seem that die-cast material is unsuitable for such work, since it does not offer great tensile strength or wear-resisting qualities. These objections are overcome by the use of steel inserts at necessary points.

One photograph shows at the left a splined insert and four race inserts before casting. At the right is the finished yoke after the die cast operation. The race inserts are made from strip steel suitable for carburizing, such as S.A.E. 4615. They are cut off and formed by stamping. They are then carburized and quenched. The main insert, which takes the driving load, is made from carbon steel, such as S.A.E. 1040, or, if exceptional strength is required in a given size, from an alloy such as S.A.E. 4140. The main insert is forged, heat treated to the desired hardness, and then broached.

The die is made so that the main splined insert and four race inserts are accurately located in position before casting. The main insert is placed on a splined arbor. The race inserts are placed against slidable pins which contact the inserts along their inside diameter and locate them at the correct angle and depth. Slidable horizontal pins contact the race inserts from the back (outside diameter) to hold them securely against the main pins. The casting is then made and the locating pins are withdrawn simultaneously. The die cast metal, with 12,000 lb. per sq. in. pressure and at a temperature of about 740 deg. F., contacts only the outer diameters and edges of the race



Steel inserts shown at left. Finished yoke, after die casting, shown at right

inserts. The temperature drops rapidly and the hardness of the carburized races, over 60 Rockwell "C," is not affected by the die-casting operation.

The die-cast material used is a zinc-base alloy, copper free, so that the impact value is not affected by age. The design of the main steel insert, having a high tensile strength, is such that the die-cast metal is chiefly in compression, permitting heavy loading.

After casting, the yokes are all ready for assembly without any further machining or heat treating. In the type illustrated, for use in a torque tube drive, the balls are dropped in position between the two yokes, and the cup-shaped stamping is pressed onto one yoke. A die then presses the cup down to a spherical shape over the opposite yoke. This shell holds the parts together before assembly in the car and permanently retains sufficient lubricant for the joint even if the torque tube runs dry.

The die-cast joint is said to have strength comparable to that of the same size of steel joint of the conventional type, and the manufacturer claims it has proven to be amply strong to stand heavy overloads, shock loads, fatigue, and low temperatures. The durability is, of course, just the same as with all steel yokes. The smooth, steady, ball bearing action makes for long life.

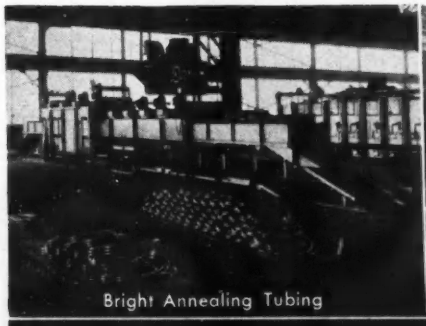
This joint is used in many applications where conditions are unusually severe and where the use of a conventional joint is impracticable, as, for example, in railway work, independently-sprung rear drives where the torque is increased by the final drive gear and the angularity is high. It is used in front- and four-wheel drives for similar reasons. This type of joint also makes possible the construction referred to on page 385 of the Sept. 19 issue of *Automotive Industries*, which consists of tilting the front end of the differential downward and mounting a Bendix-Weiss joint at the pinion, permitting a drop of over 3 in. in the propeller shaft and thus eliminating the underbody tunneling. It is now being made for all types of automotive vehicles.

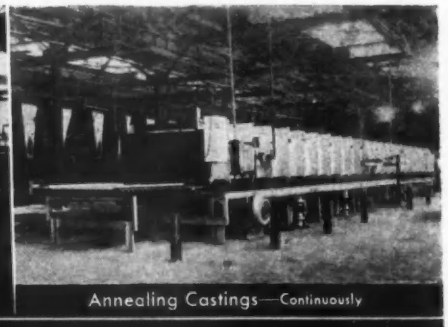
A SURVEY of current practice with respect to gross vehicle weight per square inch of brake lining in motor trucks, and a comparison of this practice with that of 1932, has been made by R. K. Super, chief engineer of the Brake Division, Linderman Devices, Inc. In the following table are given the averages of the ratios obtained by dividing the gross weight ratings of all trucks in the different capacity classes by the respective brake lining areas, for 1932 and 1936 respectively.

Maximum Rated Tonnage	Lbs. Rated Gross Load per sq. in. of Brake Lining 1932	1936
¾ and 1	23	30
1½	32	33
2	33	45
2½	35	45
3	41	44
4	43	45
5 or more	46	51
6 wheelers	52	52
Tractors (Specially designed)	(Data incomplete)	77

Mr. Super calls attention to the sharp rise in the load per sq. in. of brake lining in the 2 and 2½-ton classes, and points out that this is due to the fact that many manufacturers now give a 2-ton or 2½-ton rating to trucks formerly rated 1½ tons. Engines, frames, springs, tires, etc., may have been adequate for the heavier loads, or may have been sufficiently strengthened, but the figures show that the brake areas were not increased in proportion to the load rating.

Notable also is the extremely high load which each sq. in. of brake lining has to "stop" in the tractor classification. The gross load figures, of course, are based on truck and trailer, and the


Bright Annealing Tubing


Annealing Castings—Continuously

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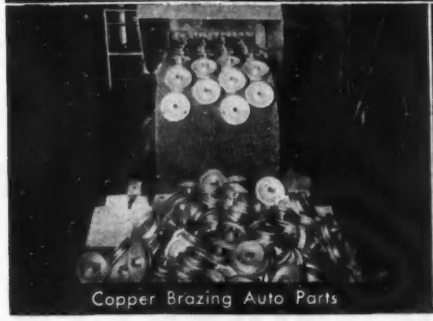
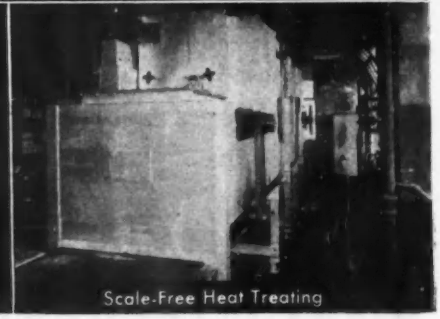
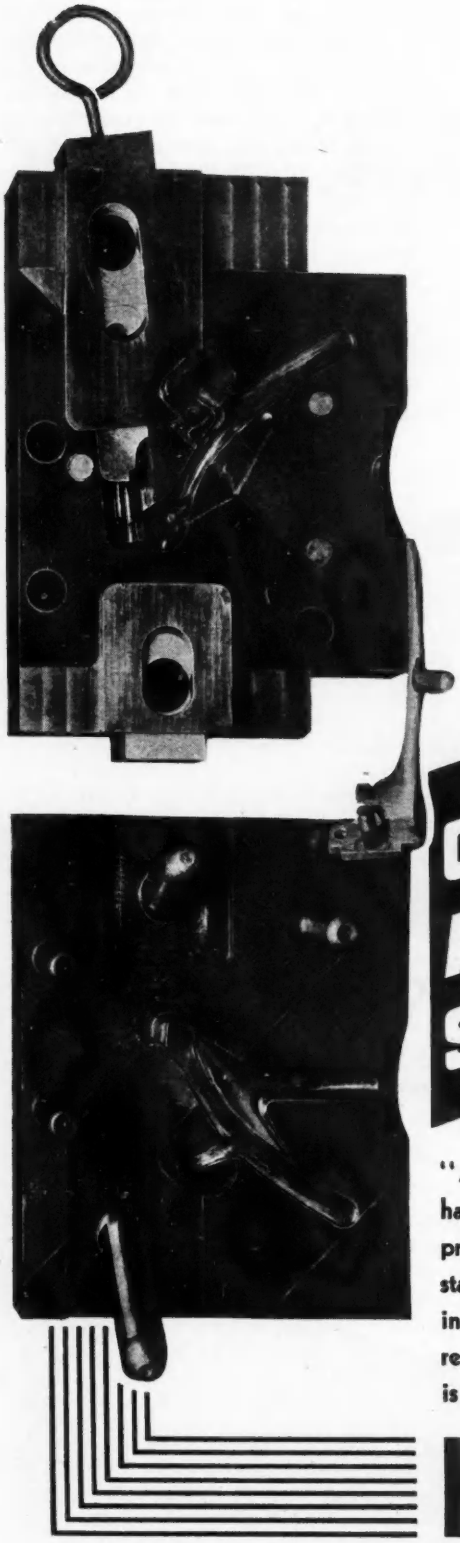

Copper Brazing Auto Parts


Scale-Free Heat Treating



CASTERS of ALUMINUM SAY . . .

"A die casting steel that air hardens from low temperature with practically no movement; withstands alternate heating and cooling without fire checking; also resists erosive action of aluminum is what we want."

HOTFORM
MADE TO SPECIFICATIONS
FOR ALUMINUM CASTING

VANADIUM-
ALLOYS STEEL CO., LATROBE, PA.

braking power would be materially increased by the installation of trailer brakes. This high loading of tractor brakes is one of the reasons which led to the legal requirement in most States that all trailers be equipped with brakes to assist the tractor in stopping the vehicle.

Refining of Lubricants by Liquid Propane

THE use of liquid propane in refining lubricating oils was described in a paper contributed to the Chemical Engineering Congress of the World Power Conference held in London recently, by R. E. Wilson, P. C. Keith and R. E. Haylett of the Standard Oil Company (Indiana). In refining lubricants the aim is to remove five types of undesirable constituents, namely, paraffin wax, asphalt, heavy ends, naphthenic compounds, and colored bodies. Liquid propane has been found to possess the remarkable property of throwing out of solution all five of these constituents. For asphalt, wax and heavy ends it is the most effective solvent known, and has the further advantage of separating each of these impurities from the other two, thus yielding them in the form of a by-product that requires minimum subsequent treatment. Propane is, moreover, extremely cheap, non-toxic, non-corrosive and highly stable, and is particularly valuable in dewaxing because its "thinning-down" effect is greater than that of any other available liquid, while it can be used to produce the low temperatures required for dewaxing by allowing a part of the propane to evaporate, so that the solution is cooled down to the boiling-point of the solvent, —44 deg. F. It is not to be expected that any single solvent will precipitate so many different components of such diverse chemical and physical characteristics, and the peculiar properties of propane arises from the very rapid change which its physical and chemical properties undergo over the ordinary range of temperatures. The asphalt is first precipitated by mixing oil and propane at 120 deg. F.; by allowing part of the propane to evaporate the solution is chilled to —40 deg. F. to precipitate the wax which is removed by pressure filters; the solution is then heated to 140 deg. F., and from there on in steps, when a series of cuts are thrown out of solution by reason of the decreasing solvent powers of propane, the heaviest and most naphthenic compounds together with most of the colored compounds being thrown out first.

McCarty to Resign

(Continued from page 430)

Fayette series, have been incorporated in the 1937 series. Attention to detail and refinement are in keeping with outward improvements and new beauty. There are extra lights which turn on automatically, windshield defrosters, and headlight beam indicators. The feature whereby a full length bed can be made up in sedans, exclusive to Nash and LaFayette last year, has been retained and improved.

Firm commitments for more than 14,000 cars were made by distributors who viewed the cars last week at the largest sales meeting in Nash history, assuring the company of the best two consecutive months in more than four years, President E. H. McCarty stated. "Production now becomes our chief problem," he said. "We must consider double shifts in many departments to take care of orders already on our books, without taking into consideration the regular flow of orders which normally clear through the factory."

Starting next week the line will be presented to Nash dealers at meetings to be held by factory officials at every important distributing point in the country. At these meetings the advertising and promotion program which will put a million dollars in advertising, including a Coast to Coast radio show, behind the cars in the announcement and post show selling season also will be outlined. Details of the new cars will not be revealed to the public until formal announcement now scheduled for late in October.

Airplane Design-Performance

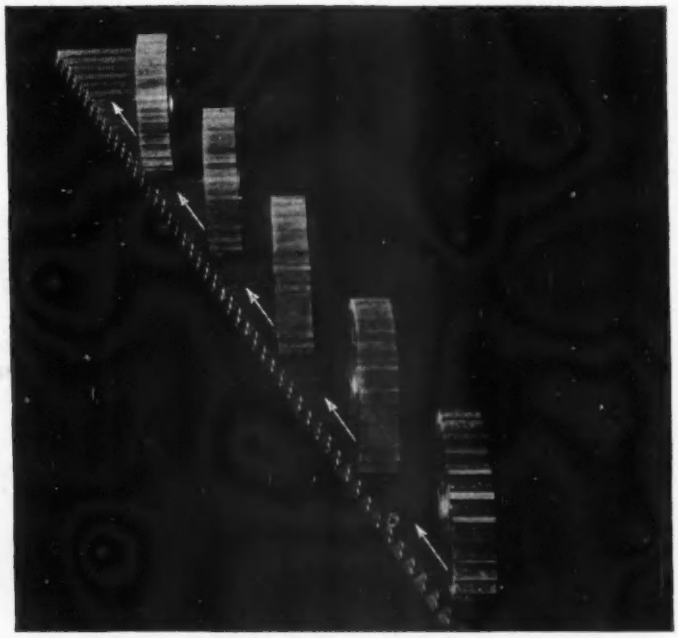
Airplane Design — Performance, by Edward P. Warner, Second Edition. Published by McGraw-Hill Book Co., Inc., New York.

THIS is a new edition of a book first published in 1927. More correctly it is the first of two volumes which will replace the earlier work. Nearly a decade had elapsed since the appearance of the first edition, and that is a long time in airplane history. It was therefore found necessary to rewrite almost the whole book, and as much new material had accumulated it was found expedient to divide the work into two volumes, the one under review dealing with predetermination of the performance of airplanes, while stability and control will be covered in the second volume. The treatment is confined to the plane and does not deal with the powerplant, except in so far as airplane powerplant outut characteristics are discussed in one chapter. Also, the mechanical design of airplanes is not dealt with, at least not to any extent. Thus the scope of the volume is rather narrow, but that is no disparagement, as it permits of thoroughness. The volume is well illustrated and contains numerous references to original sources, so it should prove valuable both as a text and as a reference book for practical designers.

Carboloy Price Reduced

A general reduction in the price of Carboloy for tools and blanks became effective as of Oct. 1, according to an announcement from the Carboloy Co., Inc., Detroit, which says that the new price will be based on 45c per gram, in any size.

THE National Liquid Fuels Department of the French Government in 1929 established in Paris a School for Mechanical Applications of Liquid Fuels which is said to have been very successful in educating engineers specializing in the design of internal-combustion engines, apparatus for the combustion of liquid fuels and their applications. It has now been decided to modify the program of the school with a view to greater specialization. The school will henceforth be known as the National School of Combustion and Explosion Engines.

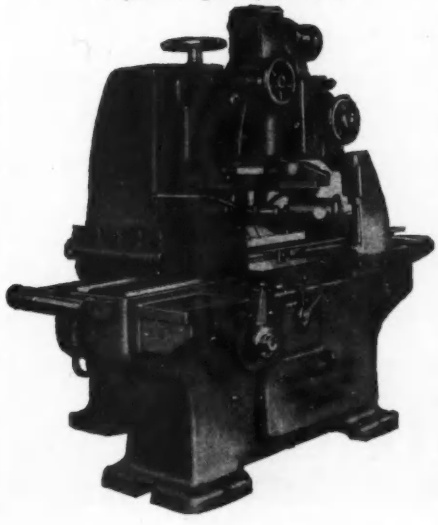


All gear design starts from a basic rack. That is why Michigan crossed axes finishing—using a rack—consistently produces more accurate gears.

"31,615 GEARS per SHARPENING"

Half-a-million or more per Rack

The Michigan Gear Finisher for helical or spur gears is now used by a majority of all important gear producers.



Minimum Tool Costs—the lowest for any finishing process—is repeatedly proven by the Michigan Gear Finisher through reports such as this one from a leading manufacturer. These two qualities—accuracy and lower gear costs—combined with flexibility, are important factors in the popularity of this machine among gear producers irrespective of production quantity.

MICHIGAN TOOL COMPANY

7171 E. McNichols Road • Detroit

Steel Famine Believed Impossible

(*Continued from page 432*)

further whittling down of surplus stocks will furnish a more sound basis for an advance than would an arbitary mark-up in the price that might not stand the test. They booked orders for about 40,000 tons in September. The price remains at 9¾ cents, delivered Connecticut point.

Cadmium—Rumors are current that a potentially heavy consumer is about to enter the market on a large scale and that this would send the price to bearing manufacturers higher than the prevailing 75 cents per pound rate.

Tin—The drop in Sterling exchange, which followed announcement of impending devaluation of Continental currencies, has had less effect on the tin market than was apprehended. Spot Straits opened the week at 45¼ cents, a shade higher than on the preceding Friday.

Lead—November contracting has got under way. Market firm.

Zinc—Quiet and unchanged.

Lukenweld Elects Chapman

Everett Chapman, who has been vice-president of Lukenweld, Inc., Coatesville, Pa., has been elected president of the company, according to an announcement by Robert W. Wolcott, president of Lukens Steel Co., of which Lukenweld is a division. Robert J. Whiting, who has been superintendent of Lukenweld, has been named vice-president.

Globe-Union Changes Name

Announcement has been made by C. O. Wanvig, president of Globe-Union Mfg. Co., that at its last stockholders' meeting, the corporate name "Globe-Union Mfg. Co." was changed to "Globe-Union Inc." The stockholders also ratified a simplification of the corporate structure. Hereafter, all factories: Atlanta, Cincinnati, Dallas, Los Angeles, Memphis, Milwaukee, Philadelphia, and Seattle, and the various operating divisions including batteries, Centralab radio parts, spark plugs, and roller skates will be operated by the same executive control of Globe-Union, Inc., at Milwaukee.

ACCURACY INSURED
...AT TOP SPEED
The correct oil film to each individual bearing...
automatically
"Barber-Colman" Hobbing Machine
● A PROLONGED HIGH-SPEED RUN! Any interruption . . . any shutdown . . . may perhaps mean an entire production schedule shot. Back a few years, you might have had cause to worry. But now, any machine can be equipped with the modern BIJUR AUTOMATIC LUBRICATING SYSTEM. Each bearing kept bathed in its correct oil film . . . continuously . . . automatically. With BIJUR installed, your mind is free. Lubrication troubles automatically dismissed!
BIJUR LUBRICATING CORP. . . . LONG ISLAND CITY, N. Y.
BIJUR
AUTOMATICALLY Correct LUBRICATION
704

Just Among Ourselves

(*Continued from page 435*)

Insulation of car bodies is believed to have approached the point where installation of air-conditioning equipment would need few changes in insulation procedure. But there are still some spots ripe for treatment, and something might be done about them with or without air-conditioning in mind. Something might be done to minimize the heat-absorbing capacity of black tops on bodies, to still further confine or direct heat radiated by the engine, and tinted glass in window lights has possibilities in temperature control within the body.

Color Is Once Again Afoot

IT is conceded generally that most of the 1937 cars will make a figurative bow in the direction of Lincoln's Zephyr and the Cord, so far as their exterior styling is concerned. In "blasé" New York, Cords at the curb still attract sizeable knots of sidewalk experts. Cord's coloring, we think, has a lot to do with it. Which makes us remind you that if production schedules continue to bulge in 1937, there may be fewer somber cars roll off the lines. Studebaker, early bird with its announcement, is trying colored mats on running boards to match body colors. Many a roving feminine eye will light — and stop—on even such a detail.

—H. H.

Publications Available

(Continued from page 433)

A new catalog, issued by Jones & Lamson Machine Co., Springfield, Vt., describes their **automatic thread grinding machine.***

A revised edition of the **Illumination Handbook,** published by the Westinghouse Lamp Co., Pittsburgh, Pa., provides up-to-the-minute information on specialized fields of illumination.*

Toledo Steel Products Co., Toledo, Ohio, offers a 336-page catalog covering their entire line.*

Folder No. 161, **The Newest Development in Fighting Fires,** is being distributed by the Pyrene Mfg. Co., Newark, N. J.*

Latest pamphlet of the Brown Instrument Co., Philadelphia, Pa., describes features of the Brown **air operated controllers.***

The automotive engineer, fleet supervisor and safety director will find valuable data in a 64-page manual recently issued by **Hoof Products Co.,** Chicago, Ill.*

Landis Machine Co., Waynesboro, Pa., recently brought out a new Operator's Instruction Book covering **Landis heat-treated dies heads.***

The Lo-Hed Hoist Div. of the American Engineering Co., Philadelphia, announces a new folder entitled **"Handle Materials via Lo-Hed."***

Common Sense Ventilation is a non-technical bulletin just issued by the Swartwout Co., Cleveland, O.*

Certified Auto Products, Inc., N. Y., offers a little manual on their NoSqueek **spring leaf bearings.***

A new booklet, entitled **"Durez Resins,"** has been brought out by General Plastics, North Tonawanda, N. Y.*

Two bulletins, **"Crankless Steel Power Presses"** and **"Clearing Single Action Presses,"** recently have been released by the Clearing Machine Corp., Chicago, Ill.*

An operator's instruction book, published by the Landis Machine Co., Inc., Waynesboro, Penna., covers the Landis **collapsible taps.***

The **National Battery Manufacturer's Assoc., Inc.,** N. Y., recently issued its second statistical yearbook, which is offered at 25 cents a copy.

The 1936 edition of the **Stanavo Pilots' Handbook** may be obtained from the Stanavo Specifications Board, N. Y.

Catalog No. 36, just published by the Elco Tool & Screw Corp., Rockford, Ill., gives compact information about **Elco products** and additional useful data.*

The American Foundry Equipment Co., Mishawaka, Ind., has announced a new folder on the **Wheelabrator multi rotary table.***

New Economies in Power Transmission is a folder recently issued by the Chas. A. Schieren Co., N. Y.*

The American Petroleum Institute has issued a brochure entitled "Black Gold." It gives a word picture of the part **petroleum products** play in daily life.*

Combating Chemical Corrosion is an interesting booklet recently brought out by the Aluminum Co. of America, Pittsburgh, Pa.*

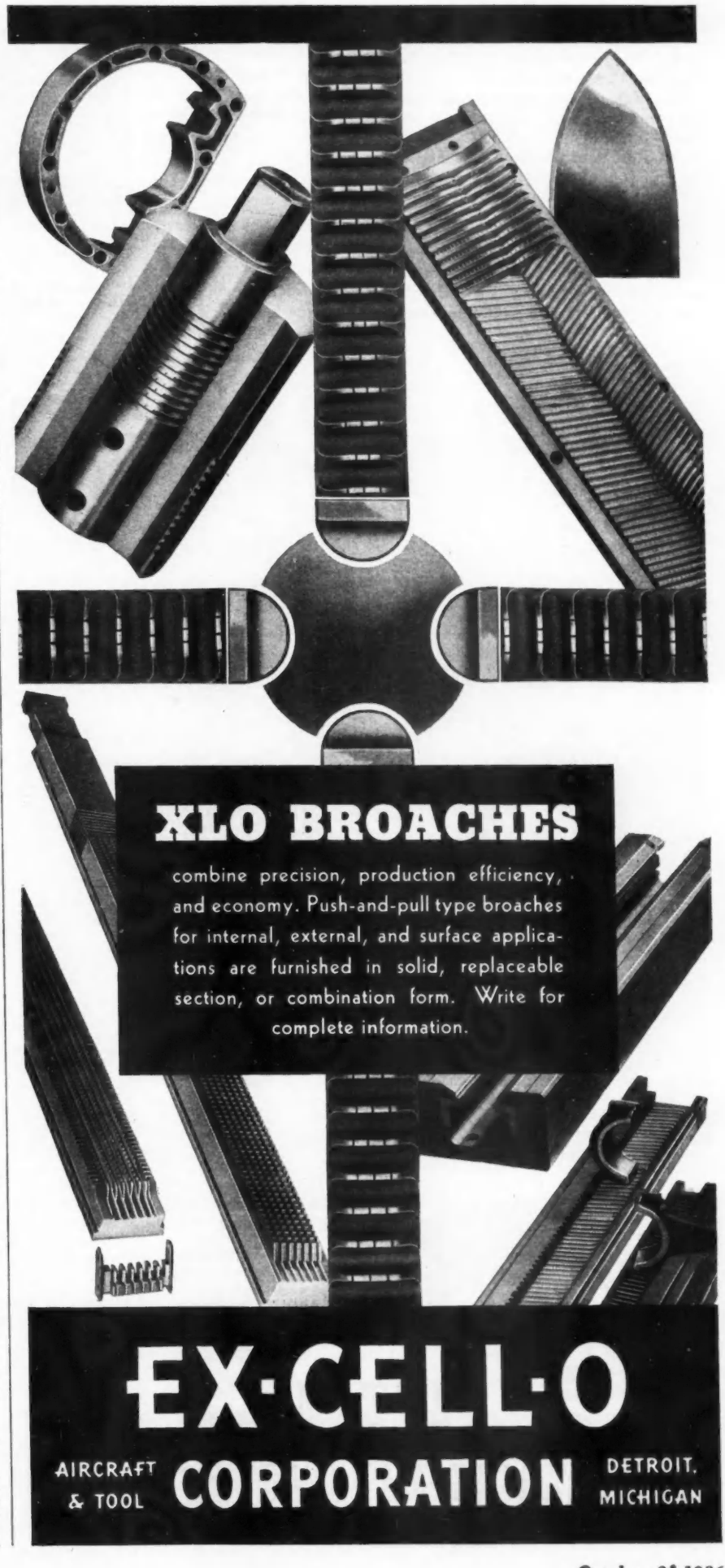
Driver-Harris Co., Harrison, N. J., has compiled booklet No. R-36 for aiding proper **selection of alloys** used for electrical, mechanical and chemical purposes.*

A new line of round chart **recording voltmeters and ammeters** for electric utilities and industrial plants is described in the latest bulletin, No. 436, just announced by the Bristol Co., Waterbury, Conn.*

Strength and Elastic Properties of Cast Iron, by W. J. Schlick and Bernard A. Moore. Bulletin No. 127 of Iowa Engineering Experiment Station, Ames, Iowa.

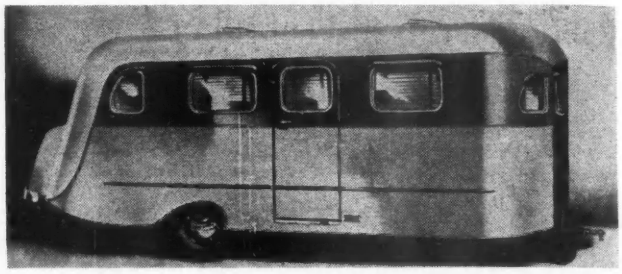
Carbon-Monoxide Indicators for Aircraft, by S. H. J. Womack and J. B. Peterson. Technical Note No. 573 of the National Advisory Committee for Aeronautics, Washington, D. C. (Relates to devices for use in aircraft cockpits to determine whether the atmosphere is safe for the occupants.)

*Available through AUTOMOTIVE INDUSTRIES.


XLO BROACHES
combine precision, production efficiency, and economy. Push-and-pull type broaches for internal, external, and surface applications are furnished in solid, replaceable section, or combination form. Write for complete information.
EX-CELL-O
AIRCRAFT & TOOL CORPORATION
DETROIT, MICHIGAN

Keeshin Freight Terminal Begun

Construction on the world's largest motor freight terminal building for the Keeshin Transcontinental Freight Lines, Inc., which was announced several months ago, has begun on the tract south of West Twelfth Street and east of the south branch of the Chicago River. John L. Keeshin, president, announced the building would be ready for occupancy by Jan. 1, 1937. The building will be 190 x 496 ft. and the office section will be three stories in height. A ramp will lead from the terminal proper to West Twelfth Street, and 200 trailers can be loaded at once.



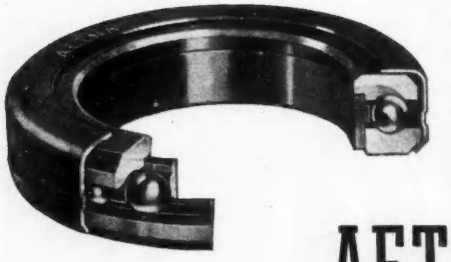
The new Edwards Home-mobile "16"

W. Howard Edwards, president of the Edwards Home-mobile Co.

MODERN motorists often drive their cars 25,000 miles before they even unpack their tool kits, but when Uncle John and Cousin Kate "bit the dust" for 25 miles, without once getting out and getting under, it was something of a motoring miracle.

This amazing transformation in motor car efficiency has been due mainly to the industry's forward looking attitude and alert acceptance of worthy improvements.

Take the history, for instance, of Aetna's "T" Type Clutch Release Bearing. Because it is self-lubricated "for life," designed to prevent escape of lubricant to clutch facings and to permanently abolish eccentric thrust (trouble's principal source), this superior bearing was quickly and unhesitatingly adopted by practically all manufacturers of cars and trucks in the big-volume field. Today, its right to such industry-wide preference has been substantiated by time and millions of merciless miles of use under all conditions. Doesn't such a record counsel you to investigate?



AETNA
BALL BEARING MANUFACTURING CO.
4608 SCHUBERT AVE., CHICAGO, ILL. DETROIT OFFICE, 7310 WOODWARD AVE.

Dealers Buying Heavily

(Continued from page 427)

cles as October of last year when plants in the U. S. and Canada built 280,316 cars and trucks. The whole new program was a little earlier a year ago, pointing for the New York Automobile Show which opened on Nov. 2 whereas this year it is to open on Nov. 11. There were more early announcements. The Ford Motor Co., which introduced on Oct. 15 last year, was in full production throughout October. Other major producers were also farther into their programs.

But the slightly later start made by most of the manufacturers will be offset to some extent by increased capacities and ability to step up production faster than a year ago. While the industry's October output may fall a little short of that in 1935, November and December are likely to run heavier. In all probability the industry will turn out more vehicles during the final quarter of this year than during the like period in 1935 when 1,107,183 units were built.

A New England office for consulting and sales engineering service to those having problems of instrumentation in manufacturing, laboratories or educational institutions, was opened recently in Boston by the Leeds & Northrup Co. at 80 Federal Street.

Graham-Paige Models Restyled for 1937

(Continued from page 451)

lower end of the piston skirt. This groove is provided with short vertical oil leads or grooves which register with port openings in the valve lifters only at timed intervals. The vertical grooves are found only on one side of the piston. On the opposite side, there is a small drilled hole which serves as a vent for trapped air and tends to produce a flow of oil around the groove.

Pistons are of the Bohn auto-thermic type, elliptically ground, and plated with a tin-base bearing alloy. It is claimed that the combination of a self-lubricating piston surface and controlled cylinder wall lubrication give the piston and ring assembly almost unlimited life and aids in reducing oil consumption at high speeds. Piston and rod assemblies are about 4 oz. lighter than before. Four rings are used on all engines—two plain taper faced rings, one "85" oil-control ring, and one of the new "X-90" damper rings.

Crankshafts of the three larger engines have been stiffened by an increase of ⅛ in. in diameter of the journals. New connecting rod forgings have a better distribution of metal to resist stresses at the big end, particularly by a special ribbing at the lower end which continues as a semi-circle about the stud head.

Larger, ventilated generators with voltage regulation are found on supercharged models. Oil filters and oil-bath air cleaners are standard. Champion type J-9, 14-mm. spark plugs are standard. Willard batteries are used throughout. Intake valves are of chrome-nickel steel, exhaust valves of Thompson XCR steel. Full-length cylinder water jackets, down-draft carburetion, and other features found last year, are continued.

Chassis Details

All models except the Series 85 have two-way direct acting hydraulic shock absorbers, rubber-cushioned and outboard mounted semi-elliptic springs, and rubber-cushioned front mounted sway bars. Clutches are of the semi-centrifugal, single-disc, ventilated type, made by Long. A new needle-bearing ball-type universal joint made by Universal Products is standard on all models. The front-spring rate has been lowered by about 15 per cent.

The new twin-lever, compound ratio Ross steering gear is found on all supercharged models and will add greatly to steering ease, particularly in parking.

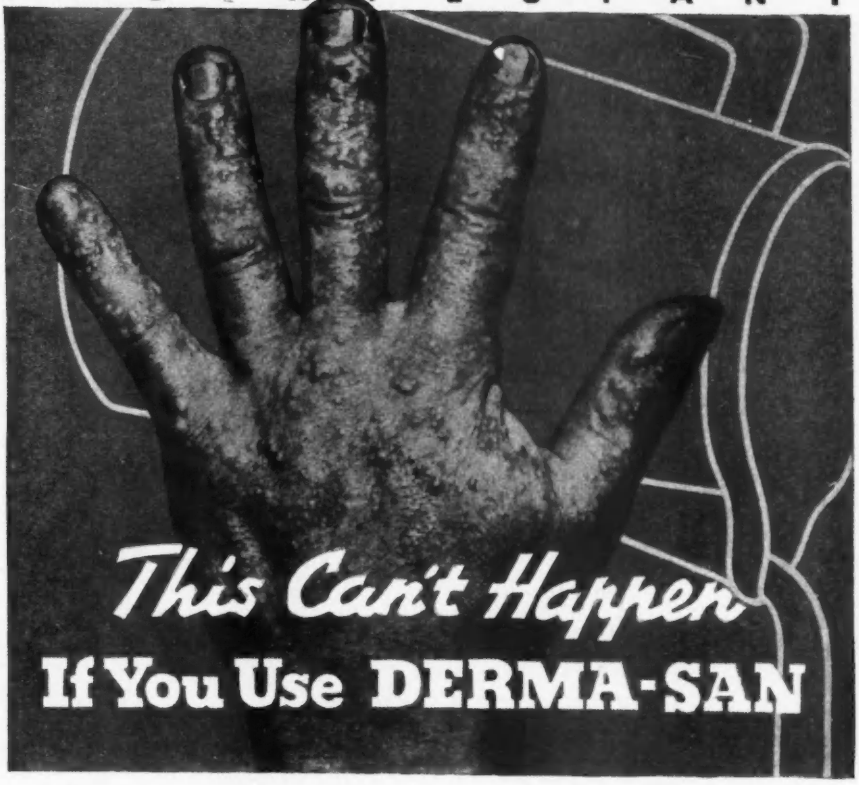
An overdrive is optional equipment on Cavalier and Supercharged models. Semi-floating, spiral bevel rear axles are continued, with a standard gear ratio of 4.27 to 1, and optional ratio of 4.7 to 1, which is standard with overdrive attachment. Three-speed synchro-silent transmissions with all-helical gears are standard on series 95, 116 and 120. Gear faces have been increased in width. Hydraulic brakes are continued. The service-brake hook-up is new, a pistol grip hand lever being mounted at the extreme left side under the instrument board and operating on a separate drum at the rear of the transmission, through a direct pull cable. Disc wheels are standard equipment. Frames are double-drop with X-type center and K-type front member.

Gasoline Down in Italy

We learn from a French contemporary that the price of gasoline in Italy, which after the application of sanctions rose from 2.5 to 4 lire per liter (75 cents to $1.20 per gallon), has now dropped to 3.05 lire per liter (92 cents per gallon).

DERMA-SAN

DISINFECTANT



OIL DERMATITIS costs plant owners millions of dollars each year. A single germ of this serious skin disease—carried from worker to worker by infected cutting lubricants—can put your entire force under doctor's care . . . cripple production . . . cause compensation payments. Protect your men from oil infections by using Derma-San. Pour one pint of Derma-San into 35 gallons of cutting lubricant and keep Oil Dermatitis out of your plant.

Derma-San is ideal for all general plant sanitation

The HUNTINGTON LABORATORIES Inc.

DENVER HUNTINGTON, INDIANA TORONTO

CLARK-SUNDH Heavy Duty Industrial Control

SAFE AND SOUND

Used in connection with the Air-Operated Combination "Clutch-Brake" as now furnished by the Press Builder, this "Clark" Safety Anti-Repeat Control equipment embodies new and very desirable features.

One unit, which can be mounted on or very near the Press contains all the necessary remote control features with the exception of the Push Buttons that are used by the Press Operators during a regular run in production. These Operators' Buttons have a locking feature which is new and desirable.

The Drum type Limit Switch takes care of all motions where adjustable limit of travel is required.

The contactor and relay panel (not here shown) completes the latest, safest and most complete Press Control Equipment on the market.

THE CLARK CONTROLLER CO.
1146 E. 152ND ST.
CLEVELAND, OHIO

Salt Spray Test for Stainless Steels

THE so-called "salt spray" test is widely used for stainless steel. Although the test has been severely criticized as a basis for predicting the behavior of these steels under general service conditions, it may be very useful for showing whether or not the surface has been finished in such a way as to insure maximum corrosion resistance.

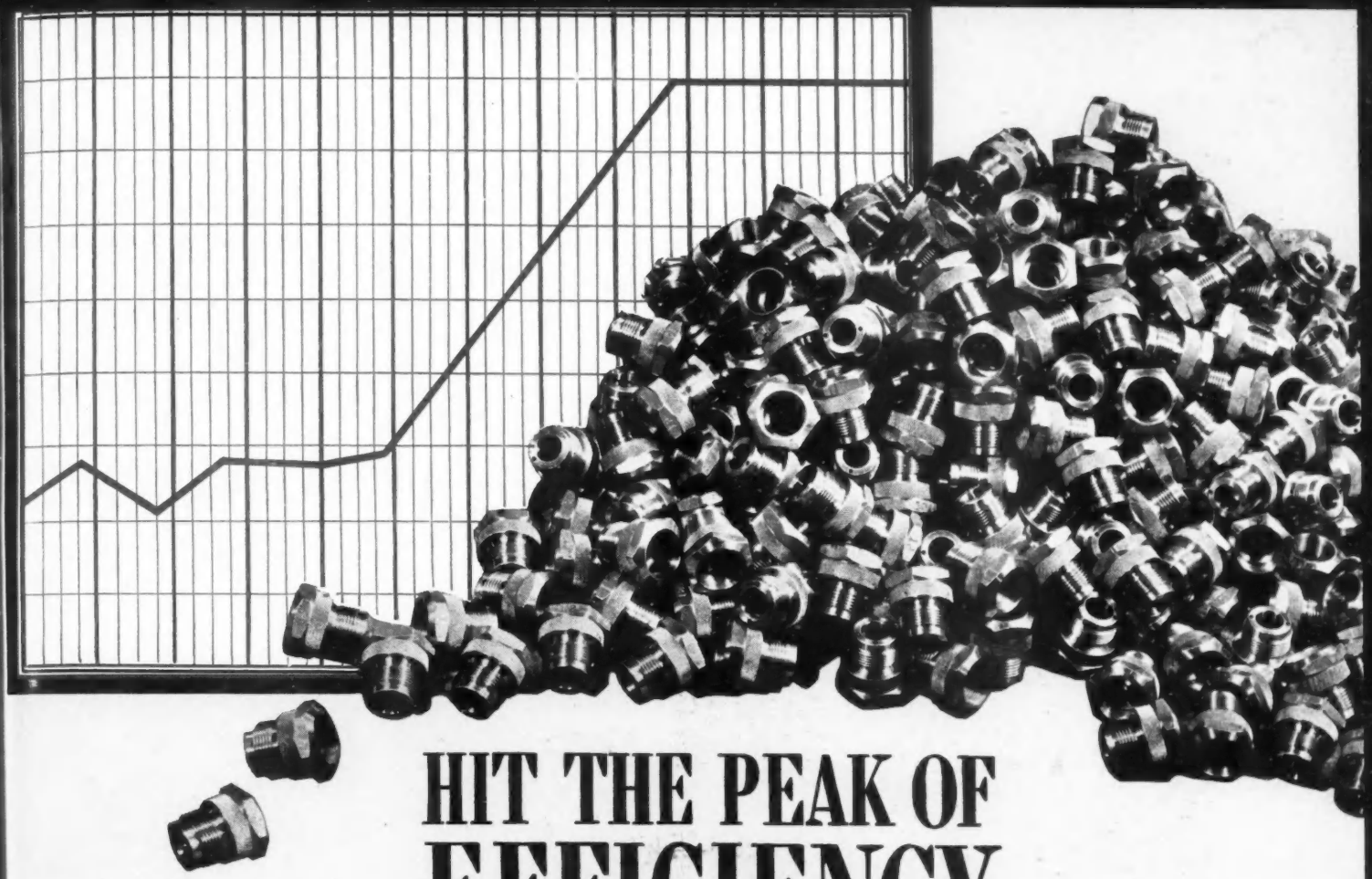
Recently, at the National Bureau of Standards, several bars of cold rolled chromium-iron alloy (17 per cent chromium), with surfaces ground smooth and bright, intended for outdoor exposure at an inland location, were exposed in a mist of a 20 per cent sodium chloride solution for 24 hours. As a result, numerous rust spots appeared at isolated points over the surfaces of the bars. However, after refinishing (during which a layer approximately 1/100 in. thick was removed from all surfaces) no pitting or rusting whatsoever was observed when the bars were exposed to the same test conditions. The test, in this case, proved that, had the bars been left with the original surface finish, the maximum resistance to corrosion inherent in the material could not have been obtained.

Literature Received

BACHARACH INDUSTRIAL INSTRUMENT COMPANY, 700 Bennett Street, Pittsburgh, Pa., is sending out a circular on the Bacharach chronomatic indicator drum for recording pressure-time diagrams. It is intended for use with the Maihak indicator.

"Asphalt—Nature's Most Versatile Product," by E. J. Pennybacker, managing director of the Asphalt Institute, is a pamphlet outlining some of the properties of asphalt and the various uses to which it is put. The pamphlet, which is profusely illustrated with pen and ink sketches, is being circulated by the Asphalt Institute, 801 Second Ave., New York, N. Y.

Three additional publications on the metallurgy and technology of tin have been received from the International Tin Research and Development Council, 149 Broadway, New York, N. Y., as follows: Factors Influencing the Rate of Attack of Mild Steels by Typical Weak Acid Media, by T. P. Hoar and D. Havenhand; The Detection and Colorimetric Determination of Tin by Means of Substituted 1:2 Dimercaptobenzenes. A Specific-Reagent for Tin, by R. E. D. Clark, and The Preparation of Substituted Benzene-o-Dithiols for Use as Specific Reagents for Tin, by R. E. Clark.



HIT THE PEAK OF EFFICIENCY WITH Union Cold Drawn Steels

WITH UNION COLD DRAWN STEELS

• In our efforts to aid the efficiency of steel users, Union Drawn recognizes four main responsibilities—(a) to meet specifications accurately, (b) to give prompt service, (c) to maintain uniformity throughout duplicate shipments and (d) to assist in the correct choice of materials for specific needs.

This coordination of plant and field service on Union Cold Drawn Bars, with all their highly developed qualities, has enabled manufacturers to point the lines of production charts toward new peaks of efficiency.

In some cases Union Cold Drawn Steels have replaced other materials or former specifications have been revised. In others, better service has been rendered. In still others, a higher quality and more consistently uniform product has been furnished.

The test of a material as well as a machine is its efficiency, from all standpoints, in actual production. Efficiency, with its resulting cost reductions, is the paramount issue in manufacture. Union Drawn offers you every facility to help you reach the peak.

UNION DRAWN STEEL CO., MASSILLON, OHIO

Manufacturers of Efficiency Steels

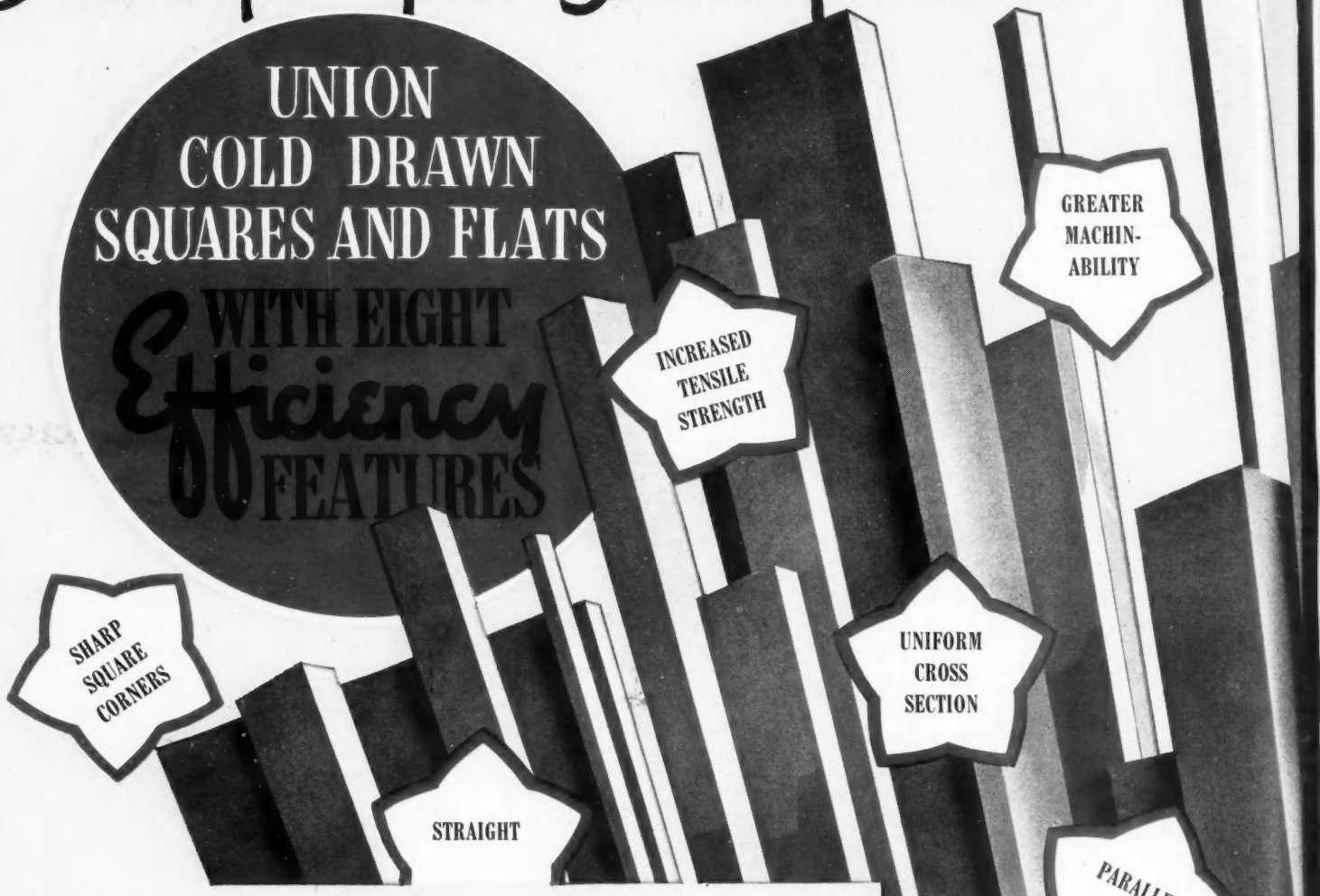
SUBSIDIARY OF

REPUBLIC STEEL

REPUBLIC STEEL CORPORATION

Handy to Get...Handy to Use

UNION COLD DRAWN SQUARES AND FLATS WITH EIGHT Efficiency FEATURES



• Examine a Union Cold Drawn Rectangle and you will instantly appreciate its pronounced, money-saving features of form and finish. No machining is necessary to make that surface smooth, to flatten or level off those sides or to sharpen those square corners. Union Cold Drawing put these qualities into the bar economically, then it was carefully straightened for the most particular use you may have in mind.

You will find many other distinctive qualities if the bar you have examined is "miked" from end to end for size accuracy or tested for machinability or for strength. Union Cold Drawing gives you accurate, uniform size and shape throughout the bar, makes the steel more free-cutting and almost doubles its working strength.

Furnished in an extensive size range (flats up to 12 in. wide) and warehoused by distributors at all important centers, Union Cold Drawn Flats and Squares are as handy to get as they are to use. Order one bar or a carload cut to your required lengths.

UNION DRAWN STEEL CO., MASSILLON, OHIO

Manufacturers of Efficiency Steels

SUBSIDIARY OF
REPUBLIC STEEL
REPUBLIC STEEL CORPORATION

Union Cold Drawn Steel

The Horizons of Business

(Continued from page 449)

account for 4.5 per cent of world trade compared to 19.8 per cent for Great Britain and 14.2 per cent for the United States. Nor is the rivalry general. No one of these nations, for example, competes with our export trade in automobiles or agricultural machinery. The amount of French money in the American stock market has been greatly exaggerated. We doubt that it exceeds $200 million. If it leaves this country it will do so in the form of gold, which we can well afford, and do it gradually. The return will not be forced by fear but rather by the superior attraction and safety of domestic investment opportunities. Current developments in France would hardly encourage the return of capital no matter what the status of devaluation might be.

Possible Benefits

The action of the gold bloc has constructive aspects. It removes an uncertainty. It paves the way for international currency stabilization. The retarded countries, insofar as they have been held back by their currencies, may now join the recovery procession. Since the world in many ways is an economic whole the healing of its ailing members must benefit the other parts.

Carbon-Monoxide Indicators for Aircraft

IN cooperation with the National Advisory Committee for Aeronautics, the National Bureau of Standards has modified some commercially available carbon-monoxide indicators so as to make them more suitable for use in aircraft. These changes include an automatic regulator of the flow of the sample, remounting the parts so as to reduce the weight and size, and the substitution of an external source of suction, as a Venturi tube, for the vacuum pump. An alarm has been developed which sounds when the carbon-monoxide concentration exceeds 0.02 per cent. A method of testing has also been developed in which a standard sample of carbon monoxide is used.

The maximum amount of carbon monoxide in air to which a person may be exposed without harm for 1 hour is 0.04 per cent at the ground level, and falls off with altitude. Carbon monoxide in quantities dangerous to personnel may be present in the cockpits of airplanes or in the engine nacelles of airships. This may come about by a leak in an exhaust line, when the exhaust from the engine is used to heat a cabin or compartment, or be caused by the flow of exhaust gases into the cockpit of an airplane by an unforeseen condition of airflow. It is, therefore, highly desirable to have available a carbon-monoxide indicator suitable for use in aircraft. In some cases a continuous indication is desired; in others merely a test to insure that the airflow about the aircraft is not such as to carry the engine exhaust into the cockpit or cabin. Both requirements have been met as a result of this work. A more complete account of the project will be found in Technical Note TN573 of the National Advisory Committee for Aeronautics.

Fahrenheit Anniversary

SEPTEMBER 16 of this year marked the two-hundredth anniversary of the death of Daniel Gabriel Fahrenheit, the man who originated the thermometer scale which we are using at the present time. While the idea of taking advantage of the thermal ex-

METAL SPHERES
WITH
LAPPED SURFACES

Strom Steel Balls possess that extra measure of quality by means of which the ultimate in ball bearing performance is achieved.

This special lapping practice is exclusive with Strom.

Physical soundness — correct hardness — size accuracy and sphericity are guaranteed in all Strom Balls.

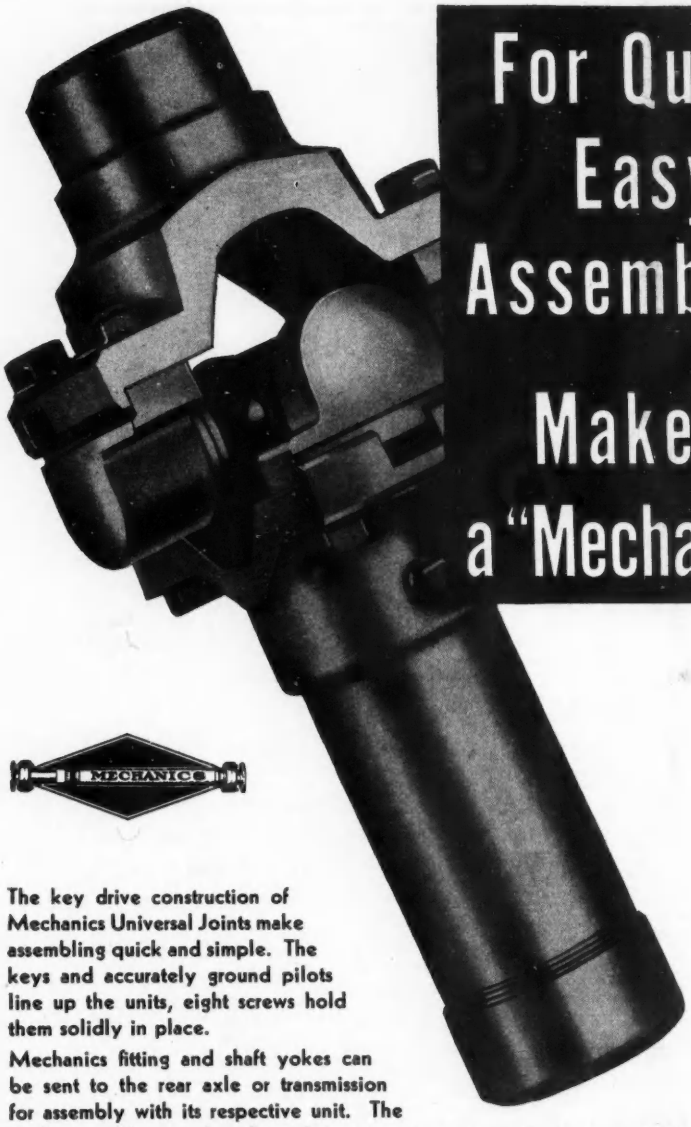
Other types of balls — STAINLESS STEEL — MONEL — BRASS & BRONZE — are also available in all standard sizes. Write for full details.

Strom STEEL BALL CO.
1850 So. 54th Avenue, Cicero, Ill.
The largest independent and exclusive Metal Ball Manufacturer

pansion of a liquid for the purpose of measuring temperature did not originate with Fahrenheit, it seems that he was the first to use mercury for the purpose. Fahrenheit, who was born at what is now the Free City of Danzig, on May 14, 1686, was an instrument maker by trade. The instruments in most extensive use at the time were of the meteorological type, and he was a skilled glass blower. While much of his life was spent in Holland and the Scandinavian countries, where he associated with leading scientists of the period, the invention of the mercury thermometer was made in his native city in 1709. A great deal of correspondence which passed between Fahrenheit and the Dutch scientist Boerhaave was found some years ago when the archives of the Russian Government were opened by the Bolsheviks, and these letters threw much light on his career.

The winter of 1709 was unduly severe at Danzig. By means of refrigerating liquids Fahrenheit succeeded in maintaining the lowest temperature observed there, and took that for the zero point of his thermometer scale. He took the temperature of boiling water to be 212 deg. and the blood temperature as 96 deg. The temperature taken for the zero point of the scale was, of course, quite accidental, and the reason for choosing it seems to have been that he did not want any zero temperatures on the scale, although he must have realized that at points farther north the atmospheric temperature would drop below his zero point.

The Fahrenheit scale was abandoned on the Continent of Europe long ago. At the present time there seems to be a tendency to abandon it also in England, and its abandonment there involves the abandonment of the B.T.U., the British thermal unit, which is based on the Fahrenheit temperature scale, and which has been replaced in scientific work at least by the C.T.U., the centigrade thermal unit.



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"Braking Efficiency"

SOME use has been made in recent years of the term "braking efficiency," by which is meant the ratio of the actual deceleration produced by (all-wheel) brakes to the acceleration of gravity (32.16 ft. per second^2). The assumption evidently is that a deceleration equal to that of gravity is the maximum possible, at least by means of the conventional friction brakes, the effect of which is dependent on the adherence between the tires and the road surface. It is true that in general the coefficient of friction between tire tread and road surface, which expresses the ratio between the maximum possible retarding force and the weight of the car, is considerably less than unity. There is, however, a "geared to the road" effect under certain conditions which makes the coefficient of friction actually greater than unity and therefore makes possible a rate of retardation greater than the acceleration of gravity. If the acceleration of gravity were taken as the basis of braking efficiency, this condition would correspond to an efficiency of more than 100 per cent, which is absurd.

The trouble is not so much with the choice of the acceleration of gravity as a unit in terms of which to express the effectiveness of the braking system, as with the use of term efficiency. For instance, if the brakes are found to give the vehicle a maximum deceleration of, say, 22.5 ft. per sec. per sec., instead of saying the brakes are 70 per cent efficient, we say the brakes produce a deceleration of 0.7-g we convey exactly the same information and we shall not commit such absurdities as talking of brakes that are, say, 110 per cent efficient.—P. M. H.